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TITLE OF THE INVENTION

IMAGING APPARATUS

ABSTRACT OF THE DISCLOSURE

A video camera that performs an exposure control in accordance with a power imaging signal level that is outputted by the imaging element, with the aperture stop, the shutter, and the gain as the exposure control parameters thereof, comprises a plurality of program photography modes, which vary the settings of the respective control parameters in response to the photography conditions thereof, includes among the plurality of program photography modes thereof a program that divides a field into a plurality of regions, performs an exposure control in accordance with the histogram of the luminosity distribution of each such region therein, in order to make the video

camera adjust to a special photographic circumstance, such as night time, or, in addition, comprises a function that selects an optimal program photography mode according to data supplied to the video camera from an external apparatus, and a function that optimizes the video and the audio alike by varying the recording characteristics of the audio signal according to the photography mode thus selected.

6. Camera Signal Process
7. Image Processing Circuit
8. Recorder
9. Gate
10. Integration Device
12. CCD Drive Circuit
14. Iris Drive Circuit
20. Key Console
25. System Control Microcomputer

WHAT IS CLAIMED IS:

1. An imaging apparatus, comprising:

an imaging element configured to optoelectrically convert an incident light that is image formed upon an imaging field;

an exposure control unit configured to control an exposure, in accordance with an output signal level of the imaging element;

a detection unit configured to divide the imaging field into a plurality of regions, and to detect a luminosity level on a per region basis thereof; and

a control unit configured to control the exposure control unit in accordance with a luminosity distribution of the plurality of regions that is detected by the detection unit;

wherein:

the control unit is configured so as to calcuate an exposure control value by increasing a weighting of a luminosity level of a prescribed number of regions from among the plurality of regions, the luminosity whereof is low.

2. An imaging apparatus, comprising:

an imaging element configured to optoelectrically convert an incident light that is

image formed upon an imaging field;

an exposure control unit configured to control an exposure, in accordance with an output signal level of the imaging element;

a detection unit configured to divide the imaging field into a plurality of regions, and to detect a luminosity level on a per region basis thereof; and

a control unit configured to control the exposure control unit in accordance with a luminosity distribution of the plurality of regions that is detected by the detection unit;

wherein:

the control unit is configured so as to calculate an exposure control value by increasing a weighting of a luminosity level of a prescribed number of regions from among the plurality of regions, the luminosity whereof is high.

3. An imaging apparatus, comprising:

an imaging element configured to optoelectrically convert an incident light that is image formed upon an imaging field;

an exposure control unit configured to control an exposure, in accordance with an output signal level of the imaging element; and

a freely attachable and detachable external

connection device configured to supply an image information from an externality of the apparatus that is mixed with the output signal of the imaging element;

wherein:

the imaging apparatus is configured so as to change a photography mode of the exposure control unit according to a control information that is supplied by the external device.

4. An imaging apparatus, comprising:

an imaging element configured to optoelectrically convert an incident light that is image formed upon an imaging field;

an exposure control unit configured to employ a plurality of exposure control parameters to perform an exposure control, in accordance with an output signal level of the imaging element, and to be capable of selecting a plurality of exposure control modes wherein a setting of the exposure control parameter varies;

an audio signal processing circuit configured to include a microphone for inputting an audio signal; and

an audio control unit configured to alter a characteristic of the microphone according to the imaging the exposure control mode.

DETAILED DESCRIPTION OF THE INVENTION

[0001]

FIELD OF THE INVENTION

The invention relates to an imaging apparatus, such as a video camera.

[0002]

Description of the Related Art

An advance of a video device, beginning with a video camera, has been eye-opening in recent years, with each respective type of function thereof being automated, and an operability thereof being improved, an instance thereof being that an automation thereupon of such as an attachment of a zoom lens, an auto focus control, or an auto exposure control, has become essential, and with respect to the auto exposure control, as an instance thereof, the auto exposure control is an element of a demand that determines a quality of a photographed image, and thus, facilitating an auto exposure control that is consistently stable and of a good quality, with respect to any or all of a photographic environment, is necessary, and an importance of an auto exposure control function is extremely high.

[0003]

Fig. 23 is a block diagram that depicts a basic configuration of an exposure control assembly of a typical video camera, wherein reference numeral 101 is

a photographic lens optical assembly, reference numeral 102 is an iris that governs an incident light quantity thereto, reference numeral 103 is an imaging element, such as a CCD, which optoelectrically converts an image, which is image formed upon an image forming surface thereof by way of the photographic lens optical assembly, and the light quantity thereof is governed by the iris, converting the image thereof into an imaging signal, reference numeral 104 is a camera signal processing circuit, which carries out a prescribed signal process upon the imaging signal that is outputted by the imaging element, thereby converting the imaging signal thereof to a standardized video signal, reference numeral 105 is a video signal output terminal, reference numeral 106 is a motor that drives the iris 102 and varies an aperture opening quantity thereof, reference numeral 107 is an aperture stop drive circuit that drive controls the motor 106, reference numeral 108 is a CCD drive circuit, which controls an accumulating, a reading out, and a reset timing of the imaging element 103, as well as variably controlling an accumulation timing, i.e., an exposure timing, of the imaging element 103, and setting a desired shutter speed, reference numeral 109 is an auto exposure control circuit, i.e., an AE circuit, which assesses an exposure state and optimally controls the exposure by controlling the aperture stop drive circuit

107 and the CCD drive circuit 108, in accordance with the level of the luminosity signal that is outputted thereto by the camera signal processing circuit, and reference numeral 110 is a switch panel, which receives an input of a key operation thereto.

[0004]

Turning to a description with respect to the exposure control by the AE circuit 109, a closed loop is configured such that the aperture stop drive circuit 107 is controlled so as to accumulate a luminosity signal that is outputted by way of the camera signal processing circuit 104, such that a level thereof is within a prescribed range, and the AE circuit 109 comprises a control assembly, which is for obtaining an appropriate exposure state by controlling the iris, controlling a drive current that is outputted to the iris motor and controlling the aperture opening quantity of the iris, controlling the CCD drive circuit 108 such that a drive pulse thereof is switched in response to the key operation of the switch panel 110, and controlling the exposure time, or, put another way, the shutter speed, by varying an accumulation time of the imaging element 103.

[0005]

In addition, the accumulation time control thereof is more commonly referred to as an electronic shutter, which is capable of selecting a light

accumulation time of a plurality of stages ranging from on the order of 1/100 of a second to 1/10000 of a second, aside from an exposure time of 1/60 of a second per field, as an instance thereof, which is a conventional exposure time for an NTSC video.

[0006]

With respect to a system configured in such a manner as described herein, when a high speed electronic shutter is employed therewith, an automatic exposure control mode exists, which controls an aperture stop mechanism, i.e., the iris, of an imaging optical assembly, as a baseline of each respective arbitrarily selected setting exposure time, or, put another way, the shutter speed, thus becoming what is referred to as a shutter priority mode. Fig. 24 depicts the shutter priority mode, wherein a shutter speed of a horizontal axis therein is selected, the shutter speed thus selected is invariant, and an aperture stop value of a vertical axis therein varies.

[0007]

PROBLEMS THAT THE INVENTION IS INTENDED TO SOLVE

With such as the video camera apparatus that is described herein, however, a circumstance frequently arises wherein it is not possible to consistently implement an appropriate exposure control across a wide range of photographic environments or photographic circumstances with the iris control and the shutter

priority mode by way of the luminosity level of the imaging signal, and thus, the appropriate exposure control thereof is not possible.

[0008]

While an appropriate performance of an exposure control at an instant of a photography would be permissible with a camera that performs an instant still image photography, in particular such as a silver halide film camera, when photographing a moving image across an extended time, such as a video camera, an auto exposure control that is consistently stable and of a good quality must be performed that naturally adheres to a photographic environment or a photographic circumstance that changes moment by moment even during the photography thereof, and an implementation of an exposure control apparatus of a video camera that satisfies the conditions described herein is accordingly greatly desired.

[0009]

It is an objective of the present invention to provide an automatic exposure control apparatus that is capable of a consistent optimal exposure control irrespective of the photographic environment or the photographic circumstance, which satisfies all of the conditions described herein.

[0010]

MEANS TO SOLVE THE PROBLEMS

In order to achieved the objective described herein, it is an aspect of the present invention that a configuration is employed that comprises an imaging element that optoelectrically converts an incident light that is image formed upon an imaging field, an exposure control unit that controls an exposure, in accordance with an output signal level of the imaging element, a detection unit that divides the imaging field into a plurality of regions, and that detects a luminosity level on a per region basis thereof, and a control unit that controls the exposure control unit in accordance with a luminosity distribution of the plurality of regions that is detected by the detection unit, wherein the control unit employs a configuration so as to calculate an exposure control value by increasing a weighting of a luminosity level of a prescribed number of regions from among the plurality of regions.

[0011]

In addition, it is an aspect according to the present invention that, in order to employ an external apparatus to effect an optimization of a photography, a configuration is employed of an imaging element that optoelectrically converts an incident light that is image formed upon an imaging field, an exposure control unit that controls an exposure, in accordance with an output signal level of the imaging element, and a

freely attachable and detachable external connection unit that supplies an image information from an externality of the apparatus that is mixed with the output signal of the imaging element, wherein a photography mode of the exposure control unit is changed according to a control information that is supplied by the external apparatus.

[0012]

In addition, it is an aspect according to the present invention that, in order to effect an optimization of a recording of an audio as well as a video in response to a photography condition, a configuration is employed comprising an imaging element that optoelectrically converts an incident light that is image formed upon an imaging field, an exposure control unit that employs a plurality of exposure control parameters to perform an exposure control, in accordance with an output signal level of the imaging element, and that is capable of selecting a plurality of exposure control modes wherein a setting of the exposure control parameter varies, an audio signal processing circuit that includes a microphone for inputting an audio signal, and an audio control unit that alters a characteristic of the microphone according to the imaging the exposure control mode.

[0013]

EFFECT

It is hereby possible to perform a control that is optimal for a set photography mode, and in particular, it is also possible to reliably meter a light on a focused basis and perform an appropriate control of a principal photographic subject that is being photographed even in a special photographic circumstance such as a photographic subject being against a high luminosity background, such as a landscape photography, or such as a photographic subject being against a dark background, such as a nighttime backdrop.

[0014]

In addition, it is also possible to improve an operability by automatically setting a photography mode according to a data from an external device, and furthermore to effect an optimization of both an audio recording as well as a video according to a photography condition, thereby allowing a greater increasing of a reproducibility of a photographic circumstance than would be otherwise possible.

[0015]

EMBODIMENTS

Following is a description of embodiments of an imaging apparatus according to the present invention, with reference to the attached drawings.

[0016]

Fig. 1 is a block diagram depicting a

configuration of a first embodiment that applies the imaging apparatus according to the invention to a video camera, and in Fig. 1, reference numeral 1 is a photographic optical lens assembly, reference numeral 2 is an iris that governs an incident light quantity, reference numeral 3 is an imaging element, such as a CCD, which optoelectrically converts an image, which is image formed upon an image forming surface thereof by way of the photographic lens optical assembly, and the light quantity thereof is governed by the iris, thereby converting the image thereof into an imaging signal, reference numeral 4 is a correlated double sample (CDS) circuit, which reduces a noise of an accumulated voltage of the imaging element, reference numeral 5 is an AGC circuit that automatically governs a gain of an imaging signal, reference numeral 6 is a camera signal processing circuit, which carries out a prescribed signal process upon the imaging signal that is outputted by the ACG circuit 5, thereby converting the imaging signal thereof to a standardized video signal, reference numeral 7 is an image signal processing circuit, which converts the video signal that is outputted by the camera signal processing circuit to a signal that is suitable for recording upon such as a video recorder, and reference numeral 8 is a video recorder that employs a magnetic tape as a recording medium.

[0017]

Conversely, reference numeral 9 is a gate circuit, which divides upon an image field into a plurality of fields, and applies a gate upon the signal that is outputted from the ACG circuit 5, in order to extract an image signal that corresponds to an arbitrary region therefrom, reference numeral 10 is an integration device, which integrates the imaging signal that corresponds to within a designated region within an imaging field, which is selected by the gate circuit 9, and derives an average light quantity thereof, and reference numeral 11 is an analog - digital (A/D) conversion unit, which converts the signal that is outputted by the integration device into a digital signal that is capable of being processed by a system control circuit (to be described hereinafter). An operation of specifying the region by the gate circuit 9 and an operation of integration by the integration device 10 relates to a designation and a weighting setting of a photometry region that corresponds to a photography mode, and it is possible to arbitrarily set a selection characteristic thereof by a control of a gate pulse that is outputted by a system control circuit 13, as well as a control of an integration reset pulse. A detailed description of a process thereof will be provided hereinafter.

[0018]

Reference numeral 12 is a CCD drive circuit, which controls such as an accumulating operation, a reading out operation, and a reset timing operation of the imaging element 3, reference numeral 13 is an iris motor that drives the iris 2, reference numeral 14 is an iris drive circuit that drives the iris motor, reference numeral 15 is a digital - analog (D/A) conversion unit that converts a digital iris control signal that is outputted by a system control circuit (to be described hereinafter) to an analog signal, reference numeral 16 is an iris encoder, which is configured of such as a hole element, and which detects an aperture quantity of the iris, or, put another way, an aperture stop value, reference numeral 17 is an amplifier, which amplifies an output of the iris encoder 16, and reference numeral 18 is an A/D conversion circuit, which converts the output of the iris encoder, which has been amplified to a prescribed level by the amplifier 17, to a digital signal that is capable of being processed by a system control circuit (to be described hereinafter).

[0019]

Reference numeral 19a, 19b, and 19c, etc., is a data look up table (LUT), which stores each respective type of data for an exposure control, and, while three tables are depicted in Fig. 1 according to the embodiment, such that a plurality of settings is

performed according to a photographic circumstance, a look up table is comprised herein for each respective photography mode that is offered herein, and is configured so as to selectively use two data tables for a full auto photography mode (to be described hereinafter). It is to be understood that an interior photography mode, a sports photography mode, a landscape photography mode, a portrait mode, and a nighttime mode is described according to the embodiment, as will be described hereinafter.

[0020]

Specifically, an information of a control characteristic of a parameter for an exposure control that corresponds to each of a plurality of photography modes, such as an iris, a shutter speed, and a gain, is stored thereupon, and a data that is required according to a selected photography mode is read out therefrom.

[0021]

Reference numeral 20 is a console unit, which is formed from a plurality of console keys, and which is for performing each respective type of operation, reference numeral 21 is a D/A conversion circuit, which converts a digital gain control signal that is outputted by a system control circuit into an analog control signal, and supplies the signal thus converted to the AGC circuit, and reference numeral 22 and 23 is a D/A conversion circuit, which respectively converts a

digital control signal that is outputted by a system control circuit to an analog signal, and supplies the signal thus converted to the camera signal processing circuit 6 and the image signal processing circuit 7, such that each respective characteristic may be either changed or corrected with a camera signal process or an image signal process according to each respective photography circumstance thereof.

[0022]

Reference numeral 25 is a system control circuit, which is configured of a microcomputer that comprehensively controls a video camera system overall, according to the embodiment.

[0023]

The system control circuit 25 outputs a control signal that controls a characteristic of the camera signal processing circuit 6 and the image signal processing circuit 7, by way of the D/A conversion circuit 22 and 23, according to the photography mode that is operated by way of the console unit 20, and which also controls a gate pulse that is supplied to the gate circuit 9 according to the photography mode, and performs a setting of a photometry region that performs a light quantity detection with respect to upon an imaging field. In addition, the system control circuit 25 controls an integration reset pulse that is supplied to the integration device 10 and controls a

selection characteristic of an integration operation thereof.

[0024]

As an instance thereof, Fig. 2 depicts an instance of setting a photometry region to an imaging field, and Fig. 2 depicts a region setting state of a center component focused photometry, wherein the photometry region is set to a center component within the imaging field, and a signal within the region thereof is employed in a focused manner in an exposure control calculation thereupon.

[0025]

The preceding is in accordance with a rule of thumb that states that a probability of a primary photographic subject being located at a near center of the field is high, and thus, when performing the actual exposure calculation, a calculation coefficient that is greater than a signal of an external area is allotted to a signal of an internal area of the center region, which is denoted by a solid line in Fig. 2, and an exposure control is performed that increases the weighting of the center portion thereof.

[0026]

Thus, the integral value is read in that corresponds to the photography mode of the photography signal with respect to an interior of the photometry region that is read in by way of the gate circuit 9, an

iris control signal is calculated that corresponds to the photography circumstance thereof, while querying the data of the LUT 19a, 19b, 19c, etc., and the iris control signal thus calculated is supplied to the iris drive circuit 14 by way of the D/A conversion unit 15, while the gain control signal is supplied to the AGC circuit 5 by way of the D/A conversion circuit 21, a control is performed that varies the gain of the AGC circuit 5 according to the photography mode and the photography circumstance thereof, and furthermore, the control signal is also supplied to the CCD drive circuit 12, whereupon a control is performed of such as an accumulation time, i.e., the electronic shutter, the read out timing, and the reset timing, of the imaging element, according to the photography mode and the photography circumstance thereof.

[0027]

In addition, each such respective control is performed while querying the output of the iris decoder 16, depending on the photography mode, and each respective type of control parameter thereof is calculated and set, with each respective control executed either selectively, simultaneously, or in a combination as appropriate.

[0028]

Thus, the system control circuit 25 performs an optimal exposure control for any and all of the

photography circumstance by causing an operation of such as the iris control, the gain control, or the drive control of the imaging element, by way of the integral value, as described herein, an instance whereof being the electronic shutter by way of the exposure time control, either simultaneously or in the combination as appropriate, in accordance with the photography mode photography circumstance and a state of the drive of the iris thereof.

[0029]

The imaging apparatus according to the present invention takes on the configuration that is described herein, and following hereinafter is a description of a specific operation thereof, according to a sequence thereof.

[0030]

The description thereof commences with a description of each respective control parameter that is employed in the exposure control with respect to the apparatus of the present invention.

[0031]

(1) Iris Opening Quantity (Parameter P1):

After the iris control signal that is outputted by the system control circuit is converted into the analog signal by the D/A conversion unit 15, the analog signal thus converted is supplied to the iris drive circuit 14 and current amplified thereupon, whereupon

the signal thus current amplified is supplied to, and drives, the iris motor 13. The iris motor 13 thereby controls an aperture stop state of the iris 2.

[0032]

If the integral value of the integration device 10 that is supplied by way of the A/D conversion unit 11 is greater than the control value that is regulated by the LUT 19a, 19b, 19c, etc. that corresponds to the photography mode, an overexposure has occurred, and thus, the iris drive circuit 14 is controlled to drive the iris motor 13 and the iris 2 in an aperture stop closing direction, thereby reducing the incident light quantity, and reducing the output level of the integration device 10 as a result thereof.

[0033]

Conversely, if the integral value that is supplied by way of the A/D conversion unit 11 is less than the control value that is regulated by the LUT 19, then, in a manner that is opposite to the foregoing description, the iris motor 13 is controlled so as to be driven in a reverse direction, thereby opening up the iris 2, increasing the incident light quantity, and increasing the integral value as a result thereof.

[0034]

(2) Shutter Speed (Parameter 2):

An accumulation time setting signal D_1 of the imaging element is outputted in a digital signal format

by the system control circuit 25, and upon a receipt thereof, the CCD drive circuit 12 generates a pulse that determines each respective type of timing of the CCD, and controls the accumulation timing thereof.

[0035]

A method of setting the accumulation time and a setting range thereof varies significantly depending on a structure of the CCD that is the imaging element, and following is a description according to the embodiment that treats a CCD as an instance thereof that possesses a structure that discharges an unnecessary voltage to an overflow drain (OFD) in an H blanking interval.

[0036]

Fig. 3 (a) describes an operation of the CCD thereof, wherein a range of a possible setting thereof is capable of being set within a range that is allowed with an image quality field such as an imaging light quantity or a smear if a high speed side is within the H blanking interval. In practical terms, the high speed aspect thereof would be on the order of 1/10000 second. In an NTSC circumstance, it would be possible to set the low speed aspect thereof at a step of an H blanking cycle, or approximately 63.5μsec., up to 1/60 second.

[0037]

Thus, as a specific time control method thereof, a shutter speed is determined by a calculation following hereinafter, by the system control circuit 25

outputting the D_1:

1. $T_{NTSC} \fallingdotseq (262.5 - D_1) * 63.5\mu sec$
2. $T_{PAL} \fallingdotseq (312.5 - D_1) * 64.0\mu sec$

[0038]

Upon receipt of an instruction in such a manner as the foregoing, the CCD drive circuit 12 further adds a ΔV_{sub} to a V_{sub}, i.e., a vertical substrate impressed voltage, changes an electric potential distribution of a voltage accumulation component, by way of an optoelectric conversion, and discharges the unnecessary voltage in a direction of a substrate, in order to implement an electronic shutter operation thereupon. It is possible thereby to arbitrarily set the shutter speed thereof. Fig. 3 (b) depicts an operation thereof.

[0039]

Thus, if a present shutter speed is faster than a control value that is regulated by the LUT 19 that corresponds to the integral value from the A/D conversion unit 11, the system control circuit 25 changes the D_1 to a smaller value than the present value thereof, in order to slow down the shutter speed, whereas conversely, if the present shutter speed is slower than the control value that is regulated by the LUT 19 thereof, the system control circuit 25 changes the D_1 to a larger value than the present value thereof,

in order to speed up the shutter speed.

[0040]

(3) Gain (Parameter P3):

A gain setting signal, which determines an amplification rate of a video signal, is outputted from the D/A conversion circuit 21, and supplied to the ACG circuit 5.

[0041]

An AGCC amplifier is installed such that a setting of an ACG gain is such that an optimal signal processing is carried out by the camera signal processing circuit 6 upon an output signal of the CDS 4 at a next stage, and conventionally is treated as a portion of a configuration element of the AE loop by way of the iris, such that it alone is not treated as an object of an arbitrary control thereof.

[0042]

In recent years, a signal to noise (S/N) ratio of the CCD has improved, and the noise of the imaging assembly has become not significantly noticeable, thus expanding a possible setting range as the control parameter, even if the gain of the AGC is taken to be large and the amplification rate increased.

[0043]

Within the imaging assembly, the gain is a parameter with a rapid control response, and thus, it is the parameter that is suited to an AE control when a

prompt reaction is demanded thereof.

[0044]

If a present AGC gain is greater than a control value that is regulated by the LUT 19 that corresponds to the integral value from the A/D conversion unit 11, the system control circuit 25 updates a gain setting value in order to make the AGC gain smaller.

[0045]

Conversely, if the present AGC gain is less than a control value that is regulated by an LUT 25 that corresponds to the integral value from an A/D conversion unit 25, the system control circuit 25 updates the gain setting value in order to make the AGC gain larger.

[0046]

According to the present invention, it is treated as being possible to employ the three parameters described herein to maintain an appropriate exposure state of the imaging assembly according to the photography circumstance and the photography mode thereof, and following is a description of a setting of a photometry region with respect to the imaging field that changes according to each respective exposure control mode, followed by a description of an exposure control that employs each respective parameter described herein.

[0047]

A photographic subject that is photographed with the video camera changes in a wide range of ways according to a place, an environment, and a photographic circumstance at a time of a photographing thereof. Accordingly, in order to consistently perform an optimal automatic exposure control with regard to the photographic circumstance thereof, it is necessary to change the setting location of the photometry region with respect to within the imaging field and the weighting control of the photometry region thereof as appropriate thereto, and to perform a control that is suited to the circumstance thereof.

[0048]

Thus, an auto photography mode is necessary that sets the photometry region wherein a larger auto exposure (AE) control calculation coefficient is allotted, and a larger weighting thereof is allotted, within the region within the field that provides an information that is effective in a determination of an exposure quantity thereof, taking into account a light beam circumstance that corresponds to a representative scene that is set, and that conceptualizes a luminosity distribution within the field thereof.

[0049]

According to the embodiment, and as depicted in Fig. 4, an instance is depicted of dividing the imaging field into four vertical divisions and six horizontal

divisions, thus dividing the imaging field as a whole into 24 small regions; for purposes of convenience of description herein, each respective region is assigned a reference numeral from 1 to 24 in Fig. 4.

[0050]

A division operation thereof is controlled by the system control circuit 25, wherein the gate circuit 9 is open and close controlled by a gate pulse that is outputted by the system control circuit 25, an output signal of the ACG circuit 5 is extracted on a per region basis for each respective region 1 to 24, an integration process is carried out with the integration device 10 upon each respective region thereof as a unique value, with a result thereof being converted to a digital signal by the A/D conversion unit 11, and the signal thus converted thereafter being taken in by the system control circuit 25.

[0051]

Within the system control circuit 25, a process is performed of assigning a weighting coefficient that is preset according to the photography mode for the integral value with regard to each respective region thereof. It is to be understood that it is possible for the process thereof to be performed as a time division process that corresponds to a 24 part division.

[0052]

Fig. 5 respectively denotes an instance of an

imaging field whereupon the weighting coefficient process is performed, wherein the optometry that is focused upon the center component is implemented by the 24-part division AE protocol according to the present invention, wherein the weighting calculation coefficient of the region 8 to 11 and 14 to 17, which correspond to the center of the field, is treated as 1.0, and the weighting calculation coefficient of the surrounding region thereof is set to 0.5, such that the AE control is focused upon the center portion thereof. Specifically, controlling the iris, the shutter speed, and the gain in accordance with the value whereto the integral value of each respective region thereof, which is thus weighted, is added, allows taking into account the weighting thereof with regard to each respective control thereof.

[0053]

In addition to the description provided herein, it is possible to set a variety of types of AE characteristics by setting the photography mode that corresponds to the photography circumstance thereof, and allowing selecting the photography program as appropriate, according to the photometry region setting and the photography circumstance (to be described hereinafter).

[0054]

Following is a description of an actual AE

control according to the photography circumstance, which employs the three parameters described herein. As described herein, it is not possible to completely respond solely with a conventional iris control if a photography is to be performed that is applicable to a wide range of photography circumstances, and thus, a further range of parameters is provided, and an optimal control thereof facilitated, according to the present invention.

[0055]

Put another way, according to the present invention, a photography control protocol referred to as a program mode has been invented, which allows conceptualizing a plurality of representative photography circumstances and performing the photography while automatically adjusting to each respective such circumstance with an optimal condition thereof. It is thus possible to arbitrarily select and set the respective program modes thereof with a key operation of the console unit 20.

[0056]

In order to perform a consistently good quality photography with respect to a wide range of locations, and under a wide range of circumstances, of the video photography, it is necessary for the present invention to comprise a plurality of auto photography, i.e., exposure control, modes that are for setting a

representative scene according to the photography circumstance, and effecting an optimization with respect to the scene.

[0057]

In order to solve the problem thereof, a plurality of look up tables (LUT) is set, which stores a control function for controlling a plurality of parameters thereof, and a plurality of tables, the LUT 19a, 19b, 19c, etc. that is depicted in Fig. 1, is configured to be prepared by a memory, such as a ROM, and to be capable of being selectively loaded from the system control circuit 25, wherein the selection thereof is performed by the key operation of the console unit 20.

[0058]

The control characteristic of each respective parameter that is controlled by the data that is loaded from the LUT 19a, 19b, 19c, etc. is depicted in Fig. 6 and Fig. 7.

[0059]

Fig. 6 is a program line diagram that depicts an operation of a program control, which is stored within the LUT 19a as an instance thereof, and which performs an appropriate exposure control by allowing setting the shutter speed of the parameter (2) to 1/100 second to an extent possible thereof, and by varying either the iris of the parameter (1) or the AGC gain of the

parameter (3) with respect to a change of a luminosity information of an inputted parameter.

[0060]

The program mode is for keeping a flicker of a fluorescent light under control that arises when using an NTSC format video camera in a region wherein a power supply frequency is 50Hz, and it would be possible to refer to the program mode thereof as an indoor photography mode.

[0061]

A horizontal axis in Fig. 6 is an illuminance of a photographic subject as the input parameter thereof, and a vertical axis therein is a setting value of each respective parameter thereof. As will be understood from Fig. 6, a setting range of each respective parameter is divided into three areas, A, B, and C, according to the input parameter thereof, or put another way, according to the illuminance of the photographic subject, and the exposure control is controlled by combining the three parameters within each respective area thereof.

[0062]

Put another way, turning to the area A thereof, the shutter speed (P2) is invariant at 1/100 second, the gain (P3) is also invariant, and the exposure control is performed by controlling the iris (P1) according to the brightness. It is possible to apply

the area A thereof to a majority of the photographic subject thereof.

[0063]

Turning to the area B, on the other hand, the illuminance has been reduced, a circumstance is depicted wherein the iris is opened up, and the iris is thus invariant at an open value, such as is depicted in Fig. 6. Accordingly, the exposure control is performed by changing the shutter speed to 1/60 second. Put another way, an accumulation and a reading out is conventionally performed at a 1/60 second frequency with the NTSC format, and thus, 1/60 second is a conventional timing of the operation thereof.

[0064]

In addition, when the illuminance is further reduced, the iris and the shutter reach a limit thereof, and thus, the exposure control is performed by increasing the gain (P3), such as is depicted in the area 3 thereof.

[0065]

It is thereby possible to perform an optimal exposure control according to the photography circumstance thereof by changing the control parameter P1 to P3 according to the change of the input parameter that denotes the illuminance of the photographic subject.

[0066]

In addition, Fig. 7 depicts a different program mode, being a line diagram of a program that is stored within the LUT 19b, as an instance thereof, being a program mode wherein the shutter speed (P2) is set as close as possible to a high speed shutter of 1/500 second, thereby keeping a blurring with respect to a fast moving photographic subject under control, allowing a clear, crisp field to be photographed, and which will be referred to according to the present invention as a sports photography mode.

[0067]

As will be understood from Fig. 7, the shutter speed is maintained as close to 1/500 second as possible with respect to the area A and the area B therein, with the exposure control being performed by the iris (P1) and the gain (P3) with regard to the illuminance of the photographic subject, and it is not until the area C, wherein the illuminance of the photographic subject is reduced and the shutter speed cannot be maintained, that the operation is at last carried out thereupon by gradually changing the shutter speed to 1/60 second.

[0068]

In addition, Fig. 12 (to be described hereinafter) is a program line diagram with respect to a landscape photography mode. While the actual program line diagram is a graph, such as is depicted in Fig. 6

and Fig. 7, Fig. 12 will be treated as depicting an operating range of the iris, the shutter speed, and the gain, in order from an upper to a lower thereof, for reasons of simplicity.

[0069]

Put another way, in Fig. 12, a reference symbol I denotes the iris control parameter (P1), a reference symbol S denotes the shutter speed control parameter (P2), and a reference symbol G denotes the gain control parameter (P3), wherein, as depicted in a right hand portion of Fig. 12, the iris control parameter (P1) operates over an interval between a CLOSE and an OPEN thereof, the S signifies that the shutter speed control parameter (P2) is invariant at a given value therein, and the G signifies that the gain control parameter (P3) changes over an interval from an amplification rate 1 of plus or minus zero dB therein, which is treated as a THROUGH, given that the input value is thus outputted as is, to a prescribed value G1 thereof. It is to be understood, however, that the value of each respective parameter changes within a region of variance thereof according to the luminosity level that is the input parameter thereof, in a manner similar to the program line diagram in Fig. 6 and Fig. 7.

[0070]

With regard to the landscape photography mode, in many circumstances thereof, such as wherein the

flicker, or the rapidly moving photographic subject, does not exist, the shutter speed (P2) is thus fixed at the standard 1/60 second, and a control is thus centered upon the iris (P1), such that the control of the gain (P3) is performed after the iris is opened up.

[0071]

Put another way, as depicted in Fig. 12, the range of control of the parameter is divided into two areas, with a value y as a boundary therebetweeen, according to a value of the luminosity of the photographic subject of the input parameter thereof. The shutter speed (P2) is fixed at 1/60 second regardless of the value of the luminosity of the photographic subject of the input parameter thereof, the AGC gain (P3) is fixed at plus or minus zero dB until the luminosity is reduced to the value y, and only the iris (P1) is controlled herein. After the luminosity is less than or equal to the value y and the iris is opened up, the control is performed by changing the AGC gain and performing an optimal exposure control thereupon.

[0072]

It is thus possible to perform the optimal exposure control even with regard to any and all photography circumstances by preparing a plurality of program modes according to the photography circumstance and selecting the program mode as appropriate with the

key operation of the console unit 20.

[0073]

It is to be understood that, when switching the photography program mode with the console unit 20, the setting of the photometry region with respect to the imaging field also switches simultaneously, in a linkage therewith. As an instance thereof, with respect to the indoor photography mode depicted in Fig. 6 and the sports photography mode depicted in Fig. 7, a photograph typically is taken in many instances thereof of the photography subject, such as a person, that is positioned in the center of the field thereof, and thus, the photometry region thereof is treated as the center component focused photometry field that is depicted in Fig. 5. In addition, even with respect to the landscape photography mode that is depicted in Fig. 12, a histogram is created of the luminosity distribution of the field in order to treat the photometry region with respect to the imaging field as the weighting distribution that is suited to the mode thereof, in the linkage with the operation to switch to the photography mode thereof, and the exposure is controlled so as to remove an effect of a high luminosity such as a sky or a surface of water.

[0074]

As an aside, the control of each respective parameter with respect to each respective program line

diagram thereof possesses a characteristic as depicted hereinafter.

[0075]

Put another way, as is understood from Fig. 6 and Fig. 7, each respective control parameter is divided into a plurality of areas, i.e., three areas, A, B, and C, according to the embodiment, each respective area is selected according to the change of the input parameter, or, put another way, according to the change of the illuminance of the photographic subject, and in addition, upon examination on a per area basis, only a single variable parameter is designated to be employed for the AE control for each of the areas thereof, with the other two parameters being invariant therein. The situation thereof is depicted in a table locate below the program line diagram thereof.

[0076]

Put another way, in the area A in Fig. 6, the parameter (P1) is variable and the other parameters therein are invariant, or, put another way, when performing the iris control, the shutter speed and the gain are invariant therein.

[0077]

In addition, in the area B thereof, the parameter (P2), or, put another way, the shutter speed, is variable and the other parameters therein are invariant, and moreover, in the area C thereof, the

parameter (P3), or, put another way, the gain, is variable and the other parameters therein are invariant.

[0078]

As a result thereof, one parameter is constantly variable on the per area unit basis, and a process of calculating of the invariant parameter thereof is thus unnecessary, regardless of performing the control by varying the three control parameters therein, and thus, the calculation process thereof does not differ from the calculation process by a conventional single parameter process thereof.

[0079]

Put another way, the present invention is capable of simplifying a handling of the photography condition and the parameter to be controlled over a complex sequence of branches of a complex calculation process that naturally arises by increasing the control parameters in order to compensate for any and all of the photography circumstances, by dividing the setting region of the control parameter thereof into a plurality of regions, and treating the variable parameter within each region as a single parameter thereof and fixing the other parameters thereof, and it is thus possible thereby to implement the optimal AE control thereof without employing a large scale logic circuit or a supercomputer.

[0080]

It is to be understood that the present invention comprises one more characteristic with respect to the operation of switching the control parameter thereof.

[0081]

Put another way, what may be cited therewith is that, while a reduction of the calculation process is effected by consistently treating the variable parameter as one parameter, and fixing the other parameters thereof, a target of a regular photography is a moving image, and the photography condition changes from moment to moment, as a quality that is unique to the video camera.

[0082]

When setting each respective control parameter that corresponds to the input parameter thereof, a movement of the value of the input parameter thereof arises between the plurality of areas thus divided, in accordance with the change of the photography condition thereof. In such a circumstance, while the operation of the switching of the control parameter to be affected occurs, a means of a change of upon the field varies significantly as the parameter thereof, and it is anticipated that the field will be hard to view as the change thereof occurs frequently therewith.

[0083]

While it would be conceivable, as a

countermeasure thereto, to cause a possession of a hysteresis when transitioning the area thereof, and to keep a frequency of the transitioning of the area thereof low, the countermeasure described herein is ineffective when the switch thereof occurs, and thus, does not serve as a complete and fundamental countermeasure thereto.

[0084]

Thus, according to the present invention, as the countermeasure thereto, the two parameters of the adjacent areas are controlled, such as is depicted in Fig. 6 and Fig. 7, so as to change simultaneously only with respect to a region B1 and B2 of a boundary component that is in a vicinity of a boundary of the area thereof.

[0085]

In Fig. 6, a boundary component B1, which is bounded therein by a dashed line, is a boundary region wherein the parameter P1 and P2 operate simultaneously, and similarly thereto, the parameter P2 and P3 operate simultaneously at a boundary component B2 thereof.

[0086]

It is thus possible to treat a change of a field as having no visual irregularity even when the movement of the parameter between the areas occurs by simultaneously changing the two parameters, and the image change that is unique to each respective

parameter thereof simultaneously and gradually occurring thereupon.

[0087]

While a method of controlling the exposure by way of a plurality of photography program modes has been described herein, a configuration according to the present invention is capable of supplying the control signal in order to change according to each respective photography circumstance, from a standard location of each respective characteristic either of each respective type of image process by way of the D/A conversion circuit 22 and 23 by a directive of the system control circuit 25 corresponding to the switching of the photography mode, or a camera signal process thereof.

[0088]

Put another way, in order to consistently and optimally represent each respective scene with respect to a wide range of locations and circumstances wherein the photography is performed, a control with regard to such as the camera signal processing circuit 6 and the image processing circuit 7, that is depicted in Fig. 1, in addition to the control by the basic control parameter at the time that the photography thereof is performed, is effectual therewith.

[0089]

It would thus be conceivable to change a

nonlinear conversion characteristic of an image signal level, i.e., a knee characteristic or a gamma characteristic, with respect to the camera signal processing circuit 6 that is depicted in Fig. 1, in a manner such as is depicted in an a, b, and c in Fig. 8, and to allow a control of such as a characteristic of an aperture compensation circuit that changes an acuteness of the image, or else to apply a fade effect or an afterimage effect to an imaged video signal, as an instance thereof, as a process for applying an additional image effect with respect to the image processing circuit 7 that is also depicted in Fig. 1, thereby taking into account an imaging field that corresponds to a set representative scene and according to a set photography mode thereof.

[0090]

Fig. 9 depicts a configuration example of the camera signal processing circuit 6 that comprises a function that carries out such an additional effect, and a description of the configuration thereof, as well as an operation thereof, will follow hereinafter.

[0091]

A color signal, such as an all blue back, or an all white, as an instance thereof, is generated from a color signal processing circuit 30, and which is designated by a control signal *1 from the system control circuit 25, and the color signal thus generated,

and a signal from a field memory circuit 32 that delays a video output by a single field, is supplied to a selection switch 31, which performs a selection of one of three null signals thereupon.

[0092]

A single information that is selected from among the three items of information by an instruction *2 of the system control circuit 25 is supplied to an input terminal of a multiplication device 33 by the selection switch 31. The multiplication device 33 employs a coefficient that is outputted by a multiplication coefficient generation device 34 by an instruction *3 of the system control circuit 25 to execute a multiplication process. A multiplication result thereof is added, by an addition device 35, to a signal of a result of a similar coefficient multiplication process that is performed by a multiplication device 38 upon a video input signal that is inputted to the multiplication device 38 by an input terminal 36, and a sum of the addition thereof is supplied to an output terminal 37.

[0093]

With regard to such a sequence of the signal process thereof, only the video signal from the input terminal 36 is inputted to the addition terminal 35 when an off terminal of the null signal is selected with the selection switch, and the video input signal

is through outputted as is to the video signal output terminal 37. In such a circumstance, the coefficient of the multiplication device 38 is 1.0, i.e., a through coefficient.

[0094]

Thereafter, when the output of the color signal processing circuit 30 is selected with the selection switch 31, an output and a calculation of the multiplication coefficient generation device 34 is performed according to the instruction of the system control circuit 25, i.e., either a commencement or ending timing setting or a direct coefficient setting thereof, one of the inputted video signal from the video input terminal 36 emerges, going from zero to one by way of an inversion operation, i.e., a complement number relation of one, with respect to the coefficient thereof, another of the inputted video signal thereof is eliminated, going from one to zero thereof, and as a result thereof, the color signal and the input signal is interchanged thereby. Visually, the field changes as though it were gradually changing from a blue field to a moving picture field.

[0095]

In addition, a relation of the coefficient of the multiplication device 38 is also a complement number of 1, in a manner similar to the preceding description, even when selecting an output of the field

memory. A difference therewith is in causing an operation thereof to be fixed, as an instance thereof, to such as 0.5, rather than being dependent upon a temporal change.

[0096]

In such a circumstance, a result that is added thereto and outputted is added in a circuit at a delay of one field and at a prescribed proportion thereof, and the inputted image is displayed as though leaving a tail in a direction of a temporal axis.

[0097]

Thus, by causing such a signal process to operate with respect to such as the portrait photography mode, wherein a person is a focus of the photography thereof, as an instance thereof, it is possible to perform an image quality regulation, such as imparting a soft feeling to an image by changing such as the aperture characteristic, reducing a frequency that is associated with the acuteness of the visual characteristic of the person thereof, and by reducing a frequency response in a vicinity of 2 to 3MHz with respect to a TV signal, with respect to the camera signal processing circuit.

[0098]

In addition, by operating a circuit such as is depicted in Fig. 9, it would be possible to automatically impart an effect of a special image

process, such as being able to apply a color fade to the image thereof.

[0099]

The portrait photography mode is fundamentally a photography mode by way of the center focused photometry that carries out a weighting such as is depicted in Fig. 5 upon a photometry region such as is also depicted in Fig. 5, and when denoted with respect to the photography program mode, the program line diagram thereof is set such as is depicted in Fig. 10. While the actual program line diagram is such as is depicted in Fig. 6 and Fig. 7, Fig. 12 will be treated as depicting an operating range of the iris, the shutter speed, and the gain, in order from an upper to a lower, for reasons of simplicity.

[0100]

Put another way, in Fig. 10, a reference symbol I denotes the iris control parameter (P1), a reference symbol S denotes the shutter speed control parameter (P2), and a reference symbol G denotes the gain control parameter (P3), wherein, as depicted in a right hand portion of Fig. 10, it is signified that the iris control parameter (P1) operates over an interval between a CLOSE and an OPEN thereof, the shutter speed control parameter (P2) is displaced between a high speed (T1) and the standard of 1/60 second thereof, and the gain control parameter (P3) changes over an

interval from an amplification rate 1 of plus or minus zero dB, which is treated as a THROUGH, given that the input value is thus outputted as is, to a prescribed value G1 thereof.

[0101]

The value of each respective parameter, however, changes within a region of variance thereof according to the luminosity level that is the input parameter thereof, such as is per the program line diagram in Fig. 6 and Fig. 7.

[0102]

The portrait mode conceives that the photographic subject thereof is a person, and accordingly emphasizes photographing a shallow depth of field.

[0103]

As is understood from Fig. 10, two threshold values, y1 and y2, are placed with regard to the illuminance of the photographic subject of a horizontal axis thereof, wherein the illuminance of the photographic subject of the horizontal axis thereof is divided into three areas.

[0104]

Turning to the iris, while a control is performed by the iris in an area A thereof of a high luminosity, and the gain of the AGC is maintained as is at the plus or minus zero dB until the iris reaches the

open value thereof, given a desire to secure the signal to noise ratio with the high luminosity thereupon, the control of the iris is performed with a decline in a resolution arising from a diffraction phenomenon that is caused by a small aperture stop of the iris being taken into account thereupon.

[0105]

Specifically, the iris is controlled to the open value thereof when an inputted luminosity level is less than or equal to the y1. The iris is thus opened up at a regular luminosity, and it is possible to make the depth of field maximally shallow thereby. Put another way, the control characteristic of the iris is switched in two stages, a variable region and an open region, across a region as a whole thereof, from the high luminosity to a low luminosity therein, with the y1 as a boundary thereupon.

[0106]

Turning to the shutter speed, in the high luminosity region that is greater than or equal to the y1, the shutter speed is set to the high speed shutter speed T1 that is faster than the regular 1/60 second, which, when added to the small aperture stop countermeasure, makes the depth of field as shallow as possible even given the high luminosity, and thus, the shutter speed is set to a high speed to a certain extent. In actuality, the shutter speed thereof is set

within a range on the order of 1/250 second to 1/4000 second.

[0107]

In addition, the preceding description also means that the control is possible without having to increase the AGC gain even in the low luminosity in order to accumulate the signal to noise ratio.

[0108]

With respect to the area y1 to y2, the iris is set to the open value, and avoiding increasing the AGC gain is desirable from a standpoint of the signal to noise ratio, and thus, the exposure control is performed thereupon by changing the shutter speed between the T1 and the standard 1/60 second.

[0109]

When the luminosity level is less than or equal to the y2, the shutter speed is set to 1/60 second, which is a standard value of a television signal, i.e., NTSC.

[0110]

In such a state, the exposure control is performed only by the AGC gain, and the exposure control is thus performed by increasing the gain within an allowable range of the signal to noise ratio thereof.

[0111]

Turning to the AGC gain, as described herein, when the luminosity is greater than or equal to the y2,

the AGC gain is fixed at the plus or minus zero dB, and is controlled in a state that does not include an amplification effect of the ACG circuit 5 proper, and the region that is greater than or equal to the y2 thus accounts for a significant portion of the illuminance of the photographic subject, thus allowing obtaining a photographic image with a favorable signal to noise ratio across the entire region thereof.

[0112]

The gain control is actually performed when the inputted luminosity is less than or equal to the y2, and the exposure control is performed within the range that is allowed by the signal to noise ratio by increasing the gain thereof.

[0113]

Thus, while the photography with respect to the portrait mode is performed with the center focused photometry, it is presumed therewith that the photography therein is based upon a person, and thus, utilizing both the image quality adjustment and the image processing that is described herein is highly effective therewith.

[0114]

A basic description has thus been performed herein of the setting of each respective control parameter with regard to each respective photography mode, similarly, of the setting of the photometry

region according to the photography mode thereof, and furthermore, of the switching of the characteristic of a signal processing assembly according to the photography mode thereof.

[0115]

Following is a description of an operation of setting of each respective control parameter, such as the iris, the shutter speed, and the gain.

[0116]

Fig. 11 is a flowchart that depicts the operation of setting the parameter, including the process of the parameter of the area boundary portion described herein, with respect to the program photography mode that employs the program line diagram such as is depicted in Fig. 6 or Fig. 7, as an instance thereof.

[0117]

In Fig. 11, when the control is started, in step S1, a switching on of a power supply is monitored, and when the switching on of the power supply is effected, the process proceeds to step S2, wherein the photography program mode (M) that is selected by the console unit 20 is verified, whereupon the process proceeds to step S3, wherein either the LUT 19a, the LUT 19b, or the LUT 19c, which corresponds to the program mode thus selected is queried, and the designated program characteristic is set thereby.

[0118]

In step S4, the data is read out from the LUT that is designated in step S4 that relates to the weighting of each of the respective 24 divisions that is set upon the imaging field, the weighting thereof is performed according to the photography mode thereof, and the process proceeds to step S5 thereafter.

[0119]

In step S5, the content and the characteristic of the image process according to the photography mode thus designated is read out from the LUT, and the image quality adjustment by way of the aperture control as described according to the preceding instance, or the image process by way of such as the color fade, is set that applies to the photography mode thus designated.

[0120]

In step S6, a present area with respect to a baseline parameter axis, or, put another way, the present area from the illuminance of the photographic subject that corresponds to the input parameter, is verified.

[0121]

Thereafter, the process proceeds to step S7, wherein a branch is determined according to the present area thereof.

[0122]

If the branch thereof is determined to be the

area A, the process proceeds to step S8, wherein the iris control parameter P1 is calculated, and thereafter, in step S9, a determination is performed of an interior and an exterior of the boundary region B1 of the area, and if the region is the exterior of the boundary B1, the process proceeds to step S10, wherein the shutter speed control parameter P2 is maintained and invariant thereof, whereas if the region is the interior of the boundary B1 thereof, the process proceeds to step S11, wherein the shutter speed control P2 is calculated and updated, and thereafter, the process proceeds to step S21, wherein the gain control parameter P3 is maintained and invariant thereof, and thereafter, the process proceeds to step S24.

[0123]

In addition, if the branch thereof is determined in step S6 to be the area B, then, in step S12, the shutter speed control parameter P2 is calculated, whereupon the process proceeds to step S13, wherein a determination is performed of an interior and an exterior of each respective boundary region B1 and B2 of the area, and if the region is the interior of the B1, then, in step S14, the iris control parameter P1 is calculated, whereupon the process proceeds to step S21, wherein the gain control parameter P3 is maintained and invariant thereof, and thereafter, the process proceeds to step S24.

[0124]

If the region is the interior of the B2, then the process proceeds to step S16, wherein the gain control parameter P3 is calculated, whereupon the process proceeds to step S23, wherein the iris control parameter P1 is maintained and invariant thereof, and thereafter, the process proceeds to step S24.

[0125]

If the region is not associated with either the B1 or the B2, then, in step S15, the iris control parameter P1 is maintained and invariant thereof, in step S22, the gain control parameter P3 is maintained and invariant thereof, and thereafter, the process proceeds to step S24.

[0126]

In addition, if the branch is determined in step S7 to be the area C, then the process proceeds to step S17, wherein the gain control parameter P3 is calculated, and thereafter, in step S18, a determination is performed of an interior and an exterior of the boundary region B2 of the area, and if the region is the exterior of the boundary B2, the process proceeds to step S20, wherein the shutter speed control parameter P2 is maintained and invariant thereof, whereas if the region is the interior of the B2, the process proceeds to step S19, wherein the shutter speed control P2 is calculated and updated, and

thereafter, the process proceeds to step S23, wherein the iris control parameter P1 is maintained and invariant thereof, and thereafter, the process proceeds to step S24.

[0127]

In step S24, the value P1, P2, and P3 of each respective parameter that is set by the process described herein, or, put another way, each respective control value of the iris, the shutter speed, and the gain, is outputted by way of the system control circuit 25, the iris 2, the imaging element 3, and the AGC circuit 5 is respectively controlled according to the program mode thereof, the process stands by in step S25 thereafter until a next process time unit arrives, wherein a basic unit thereof is treated as one calculation per frame according to the embodiment, and thereafter, in step S26, an interrupt of the power supply is verified, whereas if the power supply remains switched on, the process returns to step S1, wherein the process described herein is repeatedly performed, while if an instruction is given to switch off the power supply, the process terminates.

[0128]

It is thus possible to control each respective parameter according to each respective program mode thus selected, and the exposure control is performed in accordance therewith.

[0129]

In addition, either the characteristic or an added function of the photometry region and the image signal process assembly with respect to the imaging field, which is linked to the switching of the photography program mode, also switches to either the characteristic or the added function that is suited to the photography circumstance thereof, and it is thus possible to consistently perform the optimal auto exposure control and the photography according to each respective photography circumstance thereof.

[0130]

Moreover, it is possible to perform the switch to the optimal control mode without a photography state of the camera unnaturally changing, even if the photography circumstance changes.

[0131]

Following is a description of the landscape photography mode that is the program photography mode according to the present invention, as well as a detailed description of a setting and a control of each respective photography mode of an interior configuration of the data table, i.e., the LUT, as well as the control of the control parameter by way of the setting thereupon, with the landscape photography mode being treated as an instance thereof hereinafter.

[0132]

A photographic subject of a high luminosity, such as a bright sky or a bright water surface, may easily appear within a typical field, and a photographic subject of a dark portion thereof may easily incur a loss of dark detail thereof due to an effect of the high luminosity portion thereof. In addition, it is not guaranteed that the high luminosity component will consistently be located in the center of the field even when employing the center focused optometry, and moreover, a size of the high luminosity component thereof also has a significant effect thereupon, and thus, it is not possible thereupon to perform an accurate exposure control in a manner similar thereto.

[0133]

The landscape photography mode according to the present invention is a program photography mode that is capable of determining an appropriate exposure value without being affected by such as the loss of dark detail due to the effect of the high luminosity portion thereof, and which may be selected by the operation of the console unit 20. Following is a detailed description thereof.

[0134]

Fig. 13 depicts an internal structure of an LUT, or, put another way, of a data table, which stores a definition and a characteristic of each respective

control parameter that is necessary for the control with respect to the landscape photography mode thereof, and a program diagram that depicts a transition with regard to the luminosity level of the input parameter of each respective control parameter that is defined and set by the LUT is such as is depicted in Fig. 12.

[0135]

In Fig. 12, a threshold value y1 is placed with regard to the illuminance of the photographic subject of a horizontal axis thereupon, which is the input parameter thereof, a total region thereof is divided thereby into two areas, the exposure is controlled by the iris and the gain, and the shutter speed is fixed at a standard value.

[0136]

Following is a description individually, in sequence, of each respective control parameter that is set within the data table, i.e., the LUT, for a spotlight photography mode.

[0137]

(P1: iris control parameter)

An iris control parameter changes as an input parameter Y, or, put another way, as the luminosity level, and a function f(y) of the inputted luminosity is defined as a property thereof.

[0138]

As will be understood from a data column at a

right hand of Fig. 13, when the inputted luminosity level is greater than the threshold value y1 that is depicted in Fig. 12, a necessity for a calculation is denoted with a display of "-> CAL" therein.

[0139]

The signal to noise ratio is not maintained at the high luminosity, and thus, the ACG gain, maintained at the plus or minus zero dB, i.e., the through, value, is treated as a control range of the iris from a small aperture stop to the open value thereof.

[0140]

When the inputted luminosity level is less than or equal to the y1, a control that set the iris to open is designated with an "-> OPEN" thereupon.

[0141]

It is possible to consider such a state to be an area of a noticeably low illuminance, wherein, when it is desirable to give a priority to continuing the photography even when the signal to noise ratio of the image deteriorates therein, a response thereto is achieved by increasing the AGC gain thereupon.

[0142]

The total region thereof is thus divided into two areas from the high luminosity to the low luminosity by the threshold value y1, and the control characteristic of the iris is defined thereby.

[0143]

(P2: Shutter Control Parameter)

A shutter control parameter has a fixed property thereof, which is denoted thereby such that the shutter control parameter is consistently fixed at a certain value regardless of the inputted luminosity level, and a content thereof is set to a "-> Standard Value" so as to set the shutter control parameter thereof to a standard value of a television format, such that a calculation thereof is unnecessary.

[0144]

The standard value of the television signal that is referred to in the present circumstance indicates 1/60 second with regard to NTSC, and 1/50 second with regard to PAL.

[0145]

(P3: AGC Gain)

Turning to a circumstance wherein the AGC gain is treated as a parameter to be processed, the function f(Y) of the inputted luminosity is defined by the threshold value y, a designation of "-> plus or minus zero dB" is performed when the inputted luminosity level is greater than the y1, thereby fixing the AGC gain at the plus or minus zero dB, and thus performing the gain setting that does not apply an amplification effect to the AGC circuit. Put another way, when it is possible to control the exposure by the iris, the AGC gain is invariant in order to prevent the deterioration

of the signal to noise ratio, and a calculation thereof is not necessary herein either.

[0146]

In addition, it is possible to perform an imaging with a good signal to noise ratio across the entire region thereof, because the interval in question is set so as to account for a significant portion of the range of the illuminance of the photographic subject.

[0147]

In addition, when the inputted luminosity level is less than or equal to the y1, the "-> CAL" is designated such that an optimal AGC gain is calculated and the setting of the gain control parameter is performed thereby.

[0148]

Such a state is an area of a noticeably low illuminance, wherein, when it is desirable to give a priority to continuing the photography even when the signal to noise ratio of the image deteriorates therein, a response thereto is achieved by increasing the AGC gain thereupon.

[0149]

A setting of a low illuminance countermeasure of the other parameter is already maximally performed, and the only parameter that remains to be capable of being controlled in such a state thereof is the AGC gain,

such that the exposure control is executed that effects an increase of the gain thereof within an allowable range when taking into account an overlap thereof with the deterioration of the signal to noise ratio thereupon.

[0150]

The relationship between the two areas that are divided by the threshold value y1 and the three control parameters is made clear in Fig. 12, wherein the parameter to be calculated in the present circumstance is also dispersed and positioned so as to be consistently unified with regard to each of the two areas thereof, a simplification of the calculation thereupon is effected, and the positioning thereupon is an I and a G in order from the high luminosity area therein.

[0151]

(P4: AE Weighting Parameter, or Photometry Region Weighting Setting)

An AE weighting parameter is a parameter that sets a photometry region distribution, and a weighting thereof, within the imaging field, and, as will be understood from Fig. 13, a property thereof is f(Y), a function of the inputted luminosity thereof, as is denoted in Fig. 13. Specifically, the AE weighting parameter is defined by a histogram that is created according to the inputted luminosity signal, wherein

the inputted luminosity signal level is detected with respect to each respective area of the 24 divisions of the imaging field, a histogram of the luminosity level is created therefrom, and, in order to prevent the loss of dark detail therewithin, a low luminosity component upon the imaging field is precisely detected and a control performed so as to perform a focused photometry upon the region thus detected.

[0152]

According to the embodiment, each respective luminosity level is detected with respect to the 24 division areas, an area with a luminosity level of a lowermost N (= 12) units is extracted from the luminosity histogram that is created therefrom, and an AE control is performed only upon the N units thereof.

[0153]

As a consequence thereof, it is possible to determine an appropriate exposure value without a dark component within the imaging field that is not of the primary photographic subject therein being affected, even when a high luminosity unit component is present such that an imbalance arises toward a portion of the imaging field, such as a sky.

[0154]

A circumstance of such a histogram is depicted in Fig. 14. An upper portion of Fig. 14 depicts a luminosity histogram with a horizontal axis thereof

denoting an IRE level therein, wherein a level starts at a left hand end and increases from the left and end to a right and end thereof, while a range from zero to six of a vertical axis thereof denotes a number of areas that correspond to each respective IRE level thereof.

[0155]

In addition, a lower portion of Fig. 14 is a cumulative histogram of the luminosity histogram of the upper portion thereof. A vertical axis thereof represents a number of the 24 divided regions of the imaging field.

[0156]

Fig. 14 thus denotes that a lowermost 12 areas, i.e., 1 to 12, of the 24 areas of the cumulative histogram are being extracted.

[0157]

It is thus possible to detect a low luminosity component with respect to an interior of an imaging field, to set an AE photometry characteristic that concentrates on the component thereof, and to implement an AE control that eliminates an effect of a high luminosity component of a component that is not present with respect to the primary photographic subject therein.

[0158]

(P5: AE Baseline Value Parameter)

An AE Baseline Value Parameter denotes a luminosity level that is a baseline of the exposure control, and is stored as a numerical value definition. A determination of an underexposure or an overexposure is performed based on the baseline value thereof, which is set to 50 IRE according to the embodiment. A property of the parameter is also invariant, as with the parameter described herein, and remains at a fixed value with regard to the photography mode thereof, regardless of the inputted luminosity level.

[0159]

(P6: Image Quality Adjustment Parameter)

An image quality adjustment parameter is a parameter that designates an image quality adjustment process by such as the aperture control, wherein a process content thereof is defined by a code, a property thereof is invariant and is set according to the photography mode thereof, so as not to change with the inputted luminosity level.

[0160]

The image quality adjustment parameter is set to a designation of "NORMAL" in the landscape photography mode, and in such a circumstance, a basic image quality is treated as a baseline value thereof, such that no special image process is carried out that would employ the aperture control to vary the image quality thereof.

[0161]

(P7: Image Effect Process Parameter)

An image effect process parameter is a parameter for designating an image process, such as the fade as is described in Fig. 9, wherein a process content thereof is defined by a code.

[0162]

In the present circumstance, the image effect process parameter is set to a designation of "NORMAL," wherein a basic image quality is treated as a baseline value thereof, such that no special process is carried out thereupon.

[0163]

In addition, a property of the image effect process parameter is also invariant, as with another parameter described herein, the property thereof is set according to the photography mode thereof, and does not change as the inputted luminosity level.

[0164]

Thus, a definition and a characteristic of each respective parameter that is necessary for a control is stored within the data table, i.e., the LUT, according to the present invention, which comprises a plurality of the LUT according to the photography mode, and which is capable of consistently performing an optimal control with regard to any and all photographic circumstances and photographic environments, owing to being able to select an LUT according to the

photography mode thus designated.

[0165]

The data table, i.e., the LUT, which defines the control parameter, as well as the operation characteristic of the control parameter that is set thereby, has hereby been described with the landscape photography mode treated as an instance thereof.

[0166]

Hereinafter, a detailed description will be provided of an operation of reading out a data from the LUT that is depicted in Fig. 13 to the system control circuit, calculating the control parameter, and setting the control parameter such as is depicted in Fig. 12, with reference to the flowchart that is depicted in Fig. 15.

[0167]

The process operation described herein is fundamentally performed within a process with respect to the flowchart that is depicted in Fig. 11, from the process of verifying the program photography mode in step S2 therein to the output of the iris, the shutter, and the gain control data in accordance with each respective control parameter in step S24 therein.

[0168]

Fig. 15 is an operation flowchart that depicts a sequence of setting a data that is for setting a control characteristic according to the photography

program mode, wherein a routine therein is executed in parallel with the process from step S2 to step S24 of the flowchart that is depicted in Fig. 11, and it is presumed that, after a conclusion of the routine therein, the process returns to step S25 in Fig. 11.

[0169]

Upon commencement of the control therein, in step S101, the selection of the photography mode is performed by the console unit 20 that is depicted in Fig. 1, whereupon a result of the selection thereof is received by the system control circuit 25, and in step S102, an LUT that corresponds to the photography mode thus selected is selected from among the LUT 19a to 19b.

[0170]

In step S103, an initialization setting of a parameter counter n, which is for designating a parameter, to n = 01 is performed, and in step S104, a data of a parameter Pn that is designated in step S103 is read in from the LUT thus selected.

[0171]

Turning to a description of the designation of the parameter, in the instance that is depicted in Fig. 13, a data that relates to the iris when n = 01, a data that relates to the shutter speed when n = 02, a data that relates to the AGC gain when n = 03, a data that relates to the AE weighting, i.e., the weighting coefficient of the photometry region, when n = 04, a

data that relates to an assessment baseline value of the AE, or, put another way, a level that becomes a baseline that aligns with a given luminosity level, when n = 05, a data that relates to an image quality adjustment, when n = 06, and a data that relates to such as an image process of a special effect type, when n = 07, is read in by the system control circuit 25.

[0172]

In step S105, a property of the parameter thus read in is verified, and a determination is performed as to whether the parameter thereof is dependent upon the input parameter, i.e., f(Y), or is an invariant data corresponding to the mode, and is thus not dependent upon the input parameter.

[0173]

Put another way, as depicted in the table in Fig. 13, a property denotes, with respect to the input data, or, put another way, with respect to the illuminance of the photographic subject according to the embodiment, whether the parameter changes according to a prescribed function f(Y), or is invariant, regardless of the change of the input parameter, and if the property of the parameter is dependent upon the input parameter with the f(Y) in step S105, the process proceeds to step S107, whereas, if the property of parameter is invariant therewith, the process proceeds to step S106, wherein a value of the parameter is set as the property

of the data being invariant irrespective of the luminosity level.

[0174]

In step S107, the parameter counter n is incremented by 1, i.e., being treated as n + 1, and in step S108, a verification is performed as to whether or not the parameter counter n is greater than a maximum value within the LUT, wherein the operation of step S104 to step S107 is repeatedly performed until n has reached the maximum value thereof, thus repeatedly performing the reading in of the parameter and the determination operation of the property thereof, and when n exceeds the maximum value thereof, the process moves to a data output process of step S109 and thereafter.

[0175]

Step S109 and thereafter depicts a process that performs an output calculation of a control data in accordance with the parameter that is read in from the LUT in step S101 to step S108, and in step S109, the parameter counter is reset to n = 01.

[0176]

In step S110, the property of the parameter is verified, a determination is performed thereupon as to whether the parameter is dependent upon the input parameter, i.e., f(Y), or whether the parameter is invariant corresponding to the mode, and not dependent

upon the input parameter, and if the property of the parameter is f(Y), the process proceeds to step S111, whereas, if the property of the parameter is invariant, the process proceeds to step S113, skipping step S111 and step S112.

[0177]

In step S111, an output of the integration device 10 is sampled by the A/D conversion unit 11 on a per unit process time basis, a field interval being an instance thereof, and the luminosity signal level is received by the system control circuit 25 as the input parameter thereof. The data definition of the LUT is queried in response to a value of the input signal thereof, and a determination is performed as to whether or not a data calculation thereof is necessary. If a condition of the calculation is met, the process proceeds to step S112, wherein only the parameter that is designated with respect to the present state is changed, a control of the AE is performed, and an optimal value of the parameter thereof calculated in order to appropriately regulate the exposure thereupon.

[0178]

In addition, if it is determined in step S111 that the calculation is not necessary, the process of calculating the control output in step S112 is skipped, and the process proceeds to step S113.

[0179]

In step S113, the parameter counter n is incremented by 1, and the process proceeds to step S114 with the parameter counter n as the n + 1 thereof, wherein the process returns to step S110 and the process of step S110 to step S113 is performed repeatedly relating to all of the parameters until the parameter counter n exceeds the maximum value of the parameter number of the LUT, and when the parameter counter n exceeds the maximum value of the parameter number of the LUT thereof, the process proceeds to step S115, thereupon returning to the process in step S25 of the flowchart that is depicted in Fig. 11.

[0180]

The process sequence up to reading out a characteristic of each respective parameter from the data look up table (LUT) and calculating the AE control data thereupon has thus been described herein, and it is possible thereby to execute an optimal photography by reading out a control data that is suitable to the photography circumstance from the LUT that corresponds to the photography mode that is set thereupon, and to perform the control therewith.

[0181]

The present invention thus employs a plurality of parameters to implement a control of a photography state, and effects a reading out of a setting condition of a control data from the data table that corresponds

to the photography mode thereof, and a control thereupon, thereby allowing a more finely detailed control than is possible with the conventional apparatus, and comprising an effect that is capable of an optimal photography only with a selection of the photography mode even with respect to a wide range of photography conditions thereof.

[0182]

In addition, switching the photography mode causes a switch to a setting that applies to the mode thereof in a further linkage with a photometry distribution, comprising an effect thereby such as improving an operability thereof and preventing such as an error in a setting thereof.

[0183]

Following is a detailed description of a setting operation of a night time photography mode, which is yet another program photography mode thereof, as well as a detailed description of an internal structure of the data table (LUT) and a control of a control parameter by way of a setting thereupon.

[0184]

The night time photography mode conceives of a photography circumstance such as wherein a highly luminescent photographic subject may be present within a portion of a normally dark background, and it is possible to select the night time photography mode by

the operation of the console unit 20.

[0185]

Typically, when performing a photography in a circumstance wherein such as a bright neon illumination is present within a portion of the dark background thereof, taking an average photometry of an imaging field overall, as in a conventional manner thereof, causes a low luminosity component to account for a majority of the field, and thus, the bright primary photographic subject will be overexposed, drawn along by the low luminosity component thereof, and causing a whiteout thereupon as a consequence.

[0186]

In addition, even when employing the center component focus photometry, a spot component thereof is not limited to being consistently located in a center thereof, and moreover, it would not be possible to perform a similarly precise exposure control if an area of the high luminosity component thereof is small, even within a heavily weighted region of the center component thereof.

[0187]

The night time photography mode according to the present invention is a program photography mode that is capable of performing a good exposure control even with respect to such a photography circumstance as is described herein, and as such, will be described in

detail hereinafter.

[0188]

Fig. 16 depicts an interior structure of an LUT, or, put another way, a data table, wherein is stored a definition and a characteristic of each respective control parameter that is necessary to a control with respect to the night time photography mode, and a program diagram that depicts a transition with regard to a luminosity level of an input parameter of each respective type of control parameter that is defined and set by the LUT thereof is identical to the program diagram of the landscape photography mode that is depicted in Fig. 12. Accordingly, while the description of the control parameter hereinafter will be provided with reference to Fig. 12, a value of a threshold value y1 therein will be set discretely for each respective mode thereof.

[0189]

Put another way, in Fig. 12, the threshold value y1 is placed with regard to an illuminance of the photographic subject of a horizontal axis thereof that is an input parameter thereupon, a total area thereof is divided into two areas, and the exposure control is effected by the iris and the gain, while the shutter speed is invariant therewith.

[0190]

Following is a description individually, in

sequence, of each respective control parameter that is set within the data table, i.e., the LUT, for a spotlight photography mode.

[0191]

(P1: iris control parameter)

An iris control parameter herein is identical to the iris control parameter of the landscape photography mode that is depicted in Fig. 13, and a description thereof will thus be omitted herein.

[0192]

(P2: shutter control parameter)

A shutter control parameter herein is identical to the shutter control parameter of the landscape photography mode that is depicted in Fig. 13, and a description thereof will thus be omitted herein.

[0193]

(P3: AGC Gain)

An AGC gain herein is identical to the AGC gain of the landscape photography mode that is depicted in Fig. 13, and a description thereof will thus be omitted herein.

[0194]

(P4: AE Weighting Parameter, or Photometry Region Weighting Setting)

An AE weighting parameter is a parameter that sets a photometry region distribution, and a weighting thereof, within the imaging field, and, as will be

understood from Fig. 16, a property thereof is f(Y), a function of the inputted luminosity thereof, as is denoted in Fig. 16. Specifically, the AE weighting parameter is defined by a histogram that is created according to the inputted luminosity signal, wherein the inputted luminosity signal level is detected with respect to each respective area of the 24 divisions of the imaging field, a histogram of the luminosity level created therefrom, and a component that corresponds to a high luminosity spotlight upon the imaging field is precisely detected and a control performed so as to perform a focused photometry upon the region thus detected.

[0195]

According to the embodiment, each respective luminosity level is detected with respect to the 24 division areas, an area with a luminosity level of an uppermost N (= 2) units is extracted from the luminosity histogram that is created therefrom, and an AE control is performed only upon the N units thereof.

[0196]

As a consequence thereof, it is possible to determine an appropriate exposure value without a dark component within the imaging field that is not of the primary photographic subject therein being affected, even when an illumination is present such that an imbalance arises toward a portion of the imaging field,

such as a spotlight.

[0197]

A circumstance of such a histogram is depicted in Fig. 17. An upper portion of Fig. 17 depicts a luminosity histogram with a horizontal axis thereof denoting an IRE level therein, wherein a level starts at a left hand end and increases from the left and end to a right and end thereof, while a range from zero to six of a vertical axis thereof denotes a number of areas that correspond to each respective IRE level thereof.

[0198]

In addition, a lower portion of Fig. 17 is a cumulative histogram of the luminosity histogram of the upper portion thereof. A vertical axis thereof represents a number of the 24 divided regions of the imaging field.

[0199]

Fig. 17 thus denotes that an uppermost 2 areas, i.e., 1 and 2, of the 24 areas of the cumulative histogram are being extracted.

[0200]

It is thus possible to detect a high luminosity component with respect to an interior of an imaging field, to set an AE photometry characteristic that concentrates on the component thereof, and to implement an AE control that eliminates an effect of a component

that is not present with respect to the primary photographic subject therein. The process described herein is effective when the component thereof is present. Thus, storing what is described herein respectively within the data table, and selecting therefrom as appropriate, allows extending the range of the photography thereby.

[0201]

As a consequence thereof, it is possible to set an appropriate exposure value without an interior component of the primary photographic subject being affected thereby, even with a photographic subject wherein such as an illumination such as a neon may be present within a portion of an imaging field such as in a night time situation.

[0202]

(P5: AE Baseline Value Parameter)

An AE Baseline Value Parameter denotes a luminosity level that is a baseline of the exposure control, and is stored as a numerical value definition. A determination of an underexposure or an overexposure is performed based on the baseline value thereof, which is set to 20 IRE according to the embodiment, as opposed to a typical setting of 50 IRE thereof. A property of the parameter is also invariant, as with the parameter described herein, and remains at a fixed value with regard to the photography mode thereof,

regardless of the inputted luminosity level.

[0203]

(P6: Image Quality Adjustment Parameter)

An Image Quality Adjustment Parameter herein is identical to the Image Quality Adjustment Parameter of the landscape photography mode that is depicted in Fig. 13, and a description thereof will thus be omitted herein.

[0204]

(P7: Image Effect Process Parameter)

An Image Effect Process Parameter herein is identical to the Image Effect Process Parameter of the landscape photography mode that is depicted in Fig. 13, and a description thereof will thus be omitted herein.

[0205]

(P8: Compression Point and Compression Rate Control Parameter)

A compression rate and a compression point is controlled as a parameter in order to perform a more accurate exposure control in the night time mode. According to the embodiment, a luminosity level is detected in each of the 24 respective divisions, and based thereupon, a comparison calculation is made of an average contrast of the imaging scene and of a proportion that is accounted for by a high luminosity component thereof, thereby changing the compression rate and the compression point of the high luminosity

portion of the video signal and performing an improvement of a latitude of the high luminosity portion thereof.

[0206]

Fig. 18 is a characteristic diagram that depicts a relationship between an inputted luminosity level and an outputted luminosity signal level, which denotes a situation of the compression of the video signal. In Fig. 18, reference character "a" denotes a circumstance wherein a process such as a luminosity compression or a clipping thereof is not performed, reference character "b" denotes a circumstance wherein the video signal is clipped, reference character "c" denotes a circumstance wherein the high luminosity component is compressed, and reference character "d" denotes a characteristic whereof the compression rate and a commencement point thereof is changed, and the latitude of the high luminosity component improved, for a characteristic of "c" therein.

[0207]

Thus, according to the embodiment, a configuration exists to be controlled such that when the proportion thereof that is accounted for by the high luminosity component is large, either the characteristic "c" or "d" is selected with regard to Fig. 18, and the characteristic "b" is selected therewith when the proportion thereof that is accounted

for by the high luminosity component is small.

[0208]

Put another way, according to the embodiment, when a photographic scene is dark, such as with such as a night time photography, a whiteout occurs with a bright component within the field, and it is thus possible to control the characteristic thereof to linearly change the compression point by the proportion of the high luminosity component thereof, and thus to perform a photography that is not unnatural, and such as the whiteout is not present therein.

[0209]

It is to be understood that a process sequence from reading out the characteristic of each respective parameter from the data look up table (LUT) to calculating the AE control data is identical to the process that is described in the flowchart that is depicted in Fig. 15.

[0210]

A high quality photography is thus possible without a whiteout of the photographic subject that is signified by such as a night time backdrop or a neon illumination by employing only the uppermost N areas of the luminosity histogram in accordance with the luminosity level of each respective area, with respect to a multi-area photometry protocol that divides the imaging field into a plurality of areas and performs an

exposure control in accordance with a luminosity information of each respective area thereof, and in addition, the compression rate and a compression commencement point of the luminosity signal is automatically set by the luminosity signal level of the uppermost N areas thereof, thereby facilitating an improvement of the latitude of the high luminosity component, and an improvement of a tint of the high luminosity component, thereby allowing an extension of a dynamic range of the luminosity signal.

[0211]

Following is a description according to a second embodiment of the present invention. A function has been built into a video camera in recent years that performs a special effect that takes an input, and records thereupon together with a photographed video, such as an arbitrary title, a message, or a background music (BGM) from a source that is external to the video camera. Such a function thereof is stored upon such as an IC card that is capable of being attached to, and detached from, a main body of the video camera proper, wherein the recorded data thereupon is read in by attaching such as the IC card to the main body of the video camera proper, and recording the data thereof, together with a photographic image information, to a recording medium, such as a magnetic tape, and it is possible to select from a variety of types of data,

such as the title, the message, or the BGM thereof by interchanging the IC card thereof according to a content of the photography thereof.

[0212]

The embodiment described hereinafter stores a photography mode designation code, which is for designating a photography mode that corresponds to a content of an external IC card, which is attachable to, and removable from, the main body of the video camera proper, upon the external IC card thereof, automatically selects the photography mode upon the video camera according to the photography mode designation code that is read out thereupon by attaching the IC card to the main body of the video camera proper, and automatically performs a selection and a setting of each respective type of exposure control parameter thereof.

[0213]

Fig. 19 is a block diagram that depicts a configuration according to the embodiment, and a configuration element therein that is identical to a configuration element that is depicted in the block diagram in Fig. 1 will be marked with an identical reference numeral thereto, and a description thereof will be omitted hereinafter.

[0214]

A difference between Fig. 19 and the block

diagram in Fig. 1 lies in that a connection unit 41 is installed for attaching and detaching an IC card 50, an IC card reading circuit 40 is installed for reading out each respective type of data that is stored upon the IC card 50 therefrom, such as the data of the title or the BGM, as well as the photography mode designation code, and inputting the data thus read out from the IC card 50 to a microcomputer for system control 25, and furthermore, in that a title mixing circuit 42, which overlays the data, such as the title, which is read out from within the IC card by the IC card reading circuit 40, upon the image signal that is outputted by the camera signal processing circuit 6 and whereupon a prescribed image process is carried out by the image processing circuit 7 before the recorder 8. The IC card reading circuit 40 and the title mixing circuit 42 are respectively controlled by the microcomputer for system control 25.

[0215]

Conversely, the IC card 50 may be freely attached to, and detached from, the main body of the video camera proper by way of the connection unit 41, and a title memory 52, which stores a title display data and a data that corresponds to each respective title therein, a memory 53, which stores the photography mode designation code, and a control unit 51, which reads out each respective data from each

respective "memo" thereof and supplies the data thus read out to the microcomputer for system control 25 upon the main body of the video camera proper by way of a connection point "a" and "b", is respectively installed within the IC card 50.

[0216]

Accordingly, when the IC card 50 is attached to the main body of the video camera proper and connected to the IC card reading circuit 40 at the connection unit 41, it becomes possible to read in each respective type of data that is stored upon the IC card 50, the title data that is read out from the title memory 52 by way of the control unit 51 is supplied to the title mixing circuit 42 by way of the IC card reading circuit 40, mixed with the image signal, and recorded upon a recording medium, such as a magnetic tape, with the recorder 8.

[0217]

In addition, the photography mode designation code, which is envisioned with a photographic circumstance whereof the title is used, and which is capable of performing an optimal exposure control with respect to each respective title thereupon, is stored upon the photography mode designation memory 53, is read out by the control unit 51 simultaneously with the reading out of the title data from the title memory 52, and supplied to the microcomputer for system control 25

by way of the IC card reading circuit 40, whereupon the photography mode is selected and set according to the photography mode designation code thereof, allowing a photography while automatically adjusting such that an optimal exposure control condition for the photography circumstance thereof is achieved thereby. As an instance thereof, when a title that relates to skiing is selected, it is possible to envision a photography at a ski area, and to automatically set the exposure control to a control of an optimal parameter for the high luminosity photographic subject thereof.

[0218]

While a circumstance has been described wherein the IC card is employed as a unit that controls the video camera externally according to the embodiment, it is to be understood that the present invention is not restricted thereto, and a unit would be permissible that is capable of externally controlling a function upon the main body of the video camera proper and that is capable of automatically selecting an optimal photographic mode thereupon.

[0219]

Thus, according to the embodiment, when controlling a special effects function, such as a title or a BGM, by way of an external control unit, it is possible to envision a photography condition wherein such as the title thereof is used thereupon, to

automatically select a program mode that performs an optimal parameter control thereupon, and to perform a good photography thereof by way of a simple operation.

[0220]

Following is a description of a third embodiment according to the present invention.

[0221]

While the present invention comprises a plurality of program exposure control modes that are capable of consistently performing an optimal photography regardless of a photographic circumstance thereof, such as is depicted according to each respective embodiment described herein, when performing an actual photography, an audio that is to be reproduced at each respective scene therein is an important element thereof, and thus, a recording of the audio, as well as of the video, is important. In particular, in recent years, a demand has arisen for a natural audio recording that better matches the photography circumstance, such as a high magnification zoom and a stereo audio recording. The present embodiment was devised with the point described herein in mind, and effects an optimization with respect to both the video and the audio according to the photography circumstance as per a switch of the program mode thereupon.

[0222]

Fig. 20 is a block diagram depicting a configuration according to the embodiment, and a configuration element therein that is identical to a configuration element that is depicted in Fig. 1 will be marked with an identical reference numeral thereto, and a description thereof will be omitted hereinafter.

[0223]

Reference numeral 60 is a microphone (hereinafter "mike") for an audio recording, which is a variable directionality mike that is configured of a cardioid, or a unidirectional, mike unit, and a bidirectional mike unit, with a detailed description thereof to be provided hereinafter. Reference numeral 61 is a mike sensitivity control circuit, which controls a sensitivity with respect to each direction by varying a directional angle characteristic of the mike, and reference numeral 62 is an audio circuit that controls a frequency characteristic of an audio signal and facilitates a countermeasure such as keeping a wind noise under control, and which is configured so as to be capable of applying an audio effect thereby that fits a photographed video, and to be capable of faithfully reproducing the image that is photographed thereby. Thus, the audio signal that is processed into a prescribed characteristic by way of the mike sensitivity control circuit 61 and the audio circuit 62 is supplied to the recorder 8, and is recorded thereby

upon a recording medium, such as a magnetic tape (not shown), together with the video signal.

[0224]

In addition, the mike sensitivity control circuit 61 and the audio circuit 62 is configured to so as to be controlled by a characteristic that corresponds to the program photography mode thereof, in accordance with a control signal that is supplied, by the microcomputer for system control 25, to the mike sensitivity control circuit 61 and the audio circuit 62, by way of a D/A conversion device 63 and 64, respectively.

[0225]

Fig. 22 describes a configuration and an operation of a directional angle variable system of a stereo mike by way of the variable directionality mike 60 that is in turn configured of the cardioid, or the unidirectional, mike unit, and the bidirectional mike unit.

[0226]

The mike according to the embodiment is configured of a cardioid, or a unidirectional, mike unit 80 (hereinafter "mid mike") and a bidirectional mike unit 81 (hereinafter "side mike"), wherein an output of the mid mike unit 80 is added to an output of the side mike unit 81, by way of a level control circuit 82, and is outputted thereafter as a left

channel signal, while the output of the side mike unit is inverted by an inverter 84, added to the output of the mid mike unit 80, which, in turn, is level adjusted by way of the level control circuit 82, and is outputted thereafter as a right channel signal.

[0227]

Fig. 21 (a) depicts a sensitivity directionality characteristic of each respective mike unit, i.e., the mid mike unit 80 and the side mike unit 81. The mid mike unit 80 comprises a maximum sensitivity at a frontal facing with regard to a sound source, and the sensitivity thereof declines as the sound source deviates from the frontal facing thereof, such that the mid mike unit 80 comprises a characteristic wherein the sensitivity thereof theoretically reaches zero at a rear facing thereof, whereas the side mike unit 81 comprises a maximum sensitivity at both a frontal facing and a rear facing of the mike with regard to a sound source, and comprises a characteristic wherein the sensitivity thereof theoretically reaches zero at a 90 degree and a 270 degree direction thereof, respectively.

[0228]

Accordingly, the mid mike unit 80 and the side mike unit 81 is placed at a 90 degree angle thereto, an output of the side mike unit is phase divided and a positive phase output that is composited with an output

of the mid mike unit is treated as a left side output, whereas a reverse phase output that is composited with an output of the mid mike unit is treated as a right side output, and it is thus possible to obtain a stereo effect thereof.

[0229]

In addition, when compositing the signal, the directionality angle is determined by a ratio Ss/Sm, wherein Sm is the sensitivity to the mid mike unit and Ss is the sensitivity of the side mike unit, such as is depicted in Fig. 21 (b).

[0230]

When photographing a person, being able to cut out a sound that surrounds the person being photographed and to record with a focus upon a voice of the person directly forward thereof, and thus, a narrowing of a setting of the directionality angle thereof, is preferable in such a circumstance, whereas, when being able to record a surrounding atmosphere, such as in a baseball stadium, results in a video with a sense of actually being there, an expansion of the setting of the directionality angle is effective instead.

[0231]

Thus, in order to control an automatic switching of the mike characteristic thereof according to the photography circumstance, according to the present

application, an information of the program photography mode that is set is received from the microcomputer for system control 25, and the mike characteristic is set according to the photography thereof.

[0232]

As an instance thereof, the portrait mode is configured so as to increase the sensitivity of the mike directionality of the frontal facing thereof, and to treat the frontal facing thereof as a focal aspect, accordingly lowering the surrounding sensitivity thereof and cutting out the surrounding noise thereby, whereas, such as the landscape mode or the sports mode is configured so as to expand the directionality and to facilitate the recording of the surrounding sound as well as the frontal facing thereof.

[0233]

Accordingly, it is possible, by controlling the level control circuit 82 and controlling a sensitivity ratio of the mid mike and the side mike by way of the microcomputer for system control, and thereby varying each respective directionality of the mike and combining the mike directionality thus varied with the AE control parameter, to obtain an optimized video and audio effect thereby.

[0234]

EFFECT OF THE INVENTION

As described herein, an imaging apparatus

according to the present invention employs a plurality of parameters to effect a control of a photography state, and also reads out a setting condition from a data table according to a photography mode thereof, which is suited to a photographic circumstance, and controls the setting condition thereof, comprising an effect of thereby being capable of a more finely detailed control than a conventional apparatus thereof, and of being capable of an optimal photography with only a selection of the photography mode thereof, even with respect to a wide range of photographic conditions thereupon.

[0235]

In particular, it is possible to employ a histogram of a distribution of a luminosity level within a field to set an optimal exposure, even within a photography condition that differs significantly from a typical photography condition, such as when performing a landscape photography or a night time photography.

[0236]

In addition, turning to an actual control thereof, there is comprised a photometry mode that divides an imaging field into a plurality of regions and treats the plurality of regions thus divided as a multi-area photometry protocol, creates a luminosity histogram in accordance with a luminosity level on a

per photometry region basis, and employs only N regions with an uppermost luminosity level thereof to perform an AE, and it is possible to consistently perform an optimal exposure control with respect to a variety of types of photography circumstances, such as being able to appropriately control the exposure even with a photography wherein an appropriate exposure control would conventionally be difficult, such as in a circumstance wherein a high luminosity component is present within the field, such as a sky or a water surface, in particular such as with the landscape photography, or in a circumstance wherein a small photographic subject is present, such as a bright neon illumination in a portion of a dark backdrop, as with the night time photography.

[0237]

In addition, when causing a function to operate by employing an external apparatus, such as an IC card, for such as overlaying and embedding a title or a message upon the field, or recording an audio together with a video, it is possible to significantly simplify an operation thereof, and to prevent an erroneous operation and thereby improve an operability thereof, by automatically setting a program photography mode, according to a content of an information that is supplied externally thereby, so as to correspond thereto.

[0238]

In addition, by varying a characteristic of a microphone with the photography mode thereof, it is possible to automatically set the audio, as well as the video, to the characteristic according to the photography mode thereof, and it is possible thereby to consistently perform an optimal photography for both the video and the audio, without a sense of an audio mismatch being present for the video thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram depicting a configuration wherein an imaging apparatus according to the invention is applied to an exposure control device of a video camera.

Fig. 2 depicts a photometry region with respect to a center component focused photometry.

Fig. 3 describes an operation of an electronic shutter.

Fig. 4 depicts a region division state upon an imaging field according to the present invention.

Fig. 5 describes a photometry region setting and weighting of the center component focused photometry according to the present invention.

Fig. 6 is a program line diagram that describes a parameter process corresponding to an indoor photography mode according to the present invention.

Fig. 7 is a program line diagram that describes a parameter process corresponding to a sports photography mode according to the present invention.

Fig. 8 depicts a characteristic of a camera signal processing circuit that is performed in a linkage with a switching of a photography mode according to the present invention.

Fig. 9 describes a control of an image processing circuit that is performed in a linkage with a switching of a photography mode according to the present invention.

Fig. 10 is a program line diagram that describes a parameter process that corresponds to a portrait photography mode according to the present invention.

Fig. 11 is a flowchart that describes a process that describes a parameter setting according to the present invention.

Fig. 12 is a program line diagram that describes a parameter process that corresponds to a landscape photography mode and a night time photography mode according to the present invention.

Fig. 13 describes a structure of a data table that corresponds to the landscape photography mode according to the present invention.

Fig. 14 depicts a luminosity histogram for determining a photometry region that corresponds to the landscape photography mode.

Fig. 15 is a flowchart that describes a more detailed portion of the process described in the flowchart in Fig. 11 in detail.

Fig. 16 describes a structure of a data table that corresponds to the night time photography mode according to the present invention.

Fig. 17 depicts a luminosity histogram for determining a photometry region that corresponds to the night time photography mode.

Fig. 18 describes a luminosity signal input/output characteristic, which is performed in a linkage with the switching of the photography mode, according to the present invention.

Fig. 19 is a block diagram that depicts a second embodiment of the imaging apparatus according to the present invention.

Fig. 20 is a block diagram that depicts a third embodiment of the imaging apparatus according to the present invention.

Fig. 21 is a block diagram that describes a characteristic of a microphone for an audio recording according to the third embodiment of the imaging apparatus according to the present invention.

Fig. 22 is a block diagram that depicts a configuration of an audio recording circuit according to the third embodiment of the imaging apparatus according to the present invention.

Fig. 23 is a block diagram that depicts an instance of a conventional imaging apparatus.

Fig. 24 depicts a shutter priority exposure control mode according to the imaging apparatus that is depicted in Fig. 23.

DRAWINGS

Fig. 1

6. Camera Signal Process

7. Image Processing Circuit

8. Recorder

9. Gate

10. Integration Device

12. CCD Drive Circuit

14. Iris Drive Circuit

20. Key Console

25. System Control Microcomputer

Fig. 2

Center Component Focused Area

Fig. 3 (a)

#1 Read Out Pulse

#2 One Field Interval

#3 High Speed One Pulse (1/60 Second to 1/787 Second)

#4 Exposure Interval

#5 High Speed Two Pulse (Zero to 70ns)

#6 Exposure Interval

#7 Vertical Blanking Interval

Fig. 3 (b)

#1 Sensor Accumulated Voltage

#2 Regular Operation

#3 Electronic Shutter Operation

Fig. 6

#1 Bright

#2 Illuminance of Photographic Subject

#3 Dark

#4 Boundary Region B1

#5 Boundary Region B2

#6 Parameter

#7 Area A

#8 Area B

#9 Area C

#10 P1: Iris

#11 Open Value

#12 Same

#13 P2: Shutter

#14 1/100 (Flicker-less)

#15 1/100/1/60 Second

#17 P3: Gain

#18 Same

Fig. 7

#1 Bright

#2 Illuminance of Photographic Subject

#3 Dark

#4 Boundary Region B1

#5 Boundary Region B2

#6 Parameter

#7 Area A

#8 Area B

#9 Area C

#10 P1: Iris

#11 F16 to Open Value

#12 Open Value

#13 Open Value

#14 P2: Shutter

#15 1/500 Second

#16 1/500 Second

#17 1/500 to /60 Second

#18 P3: Gain

Fig. 9

30. Color Signal Processing Circuit

32. Field Memory

33. Multiplication Device

34. Multiplication Coefficient Generation Device

35. Addition Device

36. Video Input

37. Video Output

38. Multiplication Device

#1 From System Control Circuit

Fig. 10

I: Iris

S: Shutter

G: Gain

#1 Bright

#2 Portrait Photography Mode

#3 Dark

Fig. 11

#1 START

S1. Is Power Switched On?

S2. Verify Mode (M)

S3. Query LUT (M)

S4. Set Photometry Range, Weighting

S5. Set Image Process Characteristic

S6. Verify Area

S7. Which Area?

S8. Calculate Iris

S10. Shutter Invariant

S11. Calculate Shutter

S12. Calculate Shutter

S14. Calculate Iris

S15. Iris Invariant

S16. Calculate Gain

S17. Calculate Gain

S19. Calculate Shutter

S20. Shutter Invariant

S21. Gain Invariant

S22. Gain Invariant

S23. Iris Invariant

S24. Output Iris, Shutter, Gain

S25. Next Frame?

S26. Is Power Switched Off?

#2 END

Fig. 12

I: Iris

S: Shutter

G: Gain

#1 Bright

#2 Landscape Photography Mode

Night Time Photography Mode

#3 Dark

Fig. 13

Instance of LUT Data Configuration (for Landscape Photography Mode)

#1 Parameter

#2 Property

#3 Data Description Format

#4 Data

#5 Iris

#6 Threshold Value Definition

#7 Shutter

#8 Threshold Value Definition

#9 -> Standard Value

#10 AGC Gain

#11 Threshold Value Definition

#12 AE Weighting

#13 HIST Definition

#14 AE Baseline Value

#15 Invariant

#16 Numerical Value Definition

#17 Image Quality Adjustment

#18 Invariant

#19 CODE Definition

#20 Image Effect Process

#21 Invariant

#22 CODE Definition

Fig. 15

#1 START

S101. Select Mode

S102. Select LUT

S104. Read Out Parameter Pn

S105. Verify Property

S106. Set Parameter

S110. Verify Property

S111. Verify Input Data

S112. Calculate Output Data

#2 Return to S25

Fig. 16

Instance of LUT Data Configuration (for Night Time Photography Mode)

#1 Parameter

#2 Property

#3 Data Description Format

#4 Data

#5 Iris

#6 Threshold Value Definition

#7 Shutter

#8 Threshold Value Definition

#9 -> Standard Value

#10 AGC Gain

#11 Threshold Value Definition

#12 AE Weighting

#13 HIST Definition

#14 AE Baseline Value

#15 Invariant

#16 Numerical Value Definition

#17 Image Quality Adjustment

#18 Invariant

#19 CODE Definition

#20 Image Effect Process

#21 Invariant

#22 CODE Definition

Fig. 18

#1 Output Signal

#2 Input Signal

#3 Diagram of Input/Output Characteristic of Luminosity Signal With Respect to Night Time Photography Mode

Fig. 19

6. Camera Signal Process

7. Image Processing Circuit

8. Recorder

9. Gate

10. Integration Device

12. CCD Drive Circuit

14. Iris Drive Circuit

20. Key Console

25. System Control Microcomputer

40. IC Card Read In

41. Connection Unit

42. Title Mix

50. IC Card (Title Control and Data)

51. Control Unit

52. Title Memory

53. Photography Mode Memory

Fig. 20

6. Camera Signal Process

7. Image Processing Circuit

8. Recorder

9. Gate

10. Integration Device

12. CCD Drive Circuit

14. Iris Drive Circuit

20. Key Console

25. System Control Microcomputer

60. Mike

61. Mike Sensitivity Control

62. Audio Circuit

Fig. 21 (a)

#1 Frontal Facing

#2 Mid Mike Sensitivity

#3 Rear Facing

#4 Frontal Facing

#5 Side Mike Sensitivity

#6 Rear Facing

Fig. 22

83. Curve Compensation

84. #1 Control Voltage from Zoom ENC or Directionality Angle Setting SW

Fig. 23

104. Camera Signal Process

105. Video Output

107. Aperture Stop Drive Circuit

180. Pulse

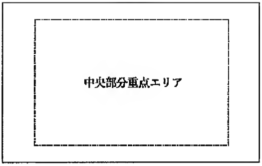
110. Key Console

Fig. 24

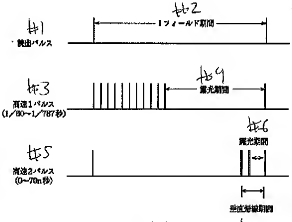
#1 (1/N Second)

#2 F Value

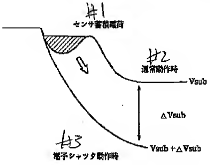
【図2】



【図3】

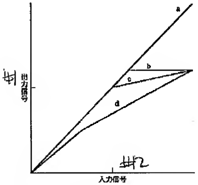


(a)



(b)

【図18】



夜景撮影モードにおける輝度信号の入出力特性図

#3

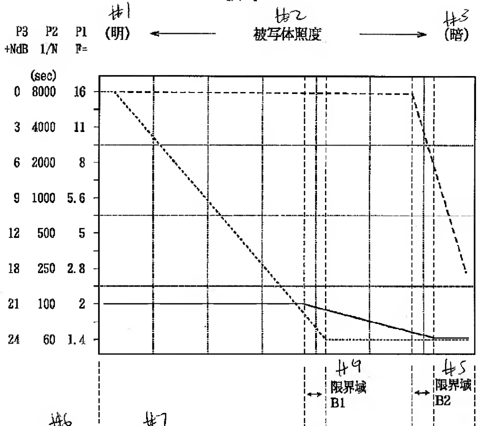
【図4】

01	02	03	04	05	06
07	08	09	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24

【図5】

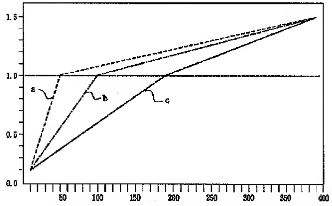
0.5	0.5	0.5	0.5	0.5	0.5
0.5	1.0	1.0	1.0	1.0	0.5
0.5	1.0	1.0	1.0	1.0	0.5
0.5	0.5	0.5	0.5	0.5	0.5

【図6】

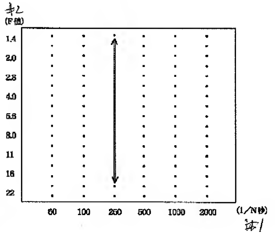


パラメーター	エリア・A	エリア・B	エリア・C
P1：アイリス	F16～F1.4	開放値	同左
P2：シャッタ	1/100（フリッカーレス）	1/100/1/60秒	同左
P3：ゲイン	±0dB	同左	0～18

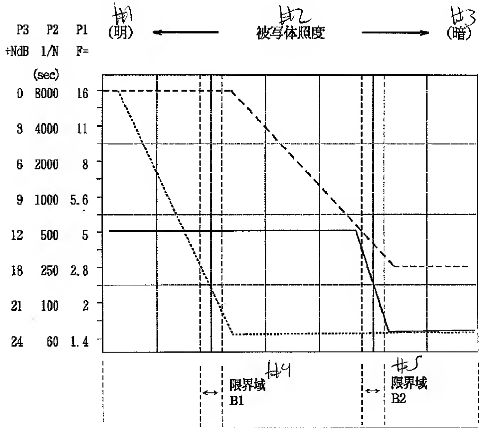
【図8】



【図24】

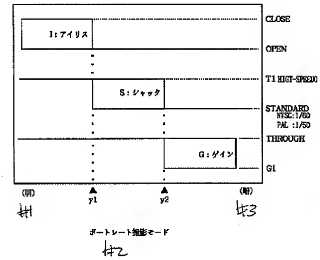


【図7】

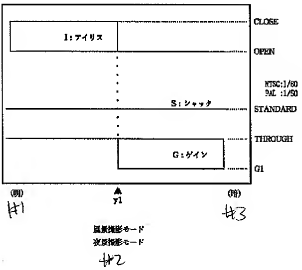


#6 パラメーター	エリア・A #7	エリア・B #8	エリア・C #9
P1：アイリス	#11 F16〜解放値	#12 開放値	#13 開放値
P2：シャッタ	1/500秒 #15	#16 1/500秒	1/500〜/60秒 #17
P3：ゲイン	±0dB	＋0〜18dB	＋18dB

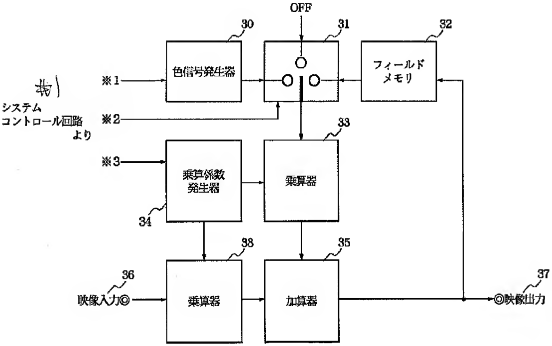
【図10】



【図12】



【図9】



【図13】

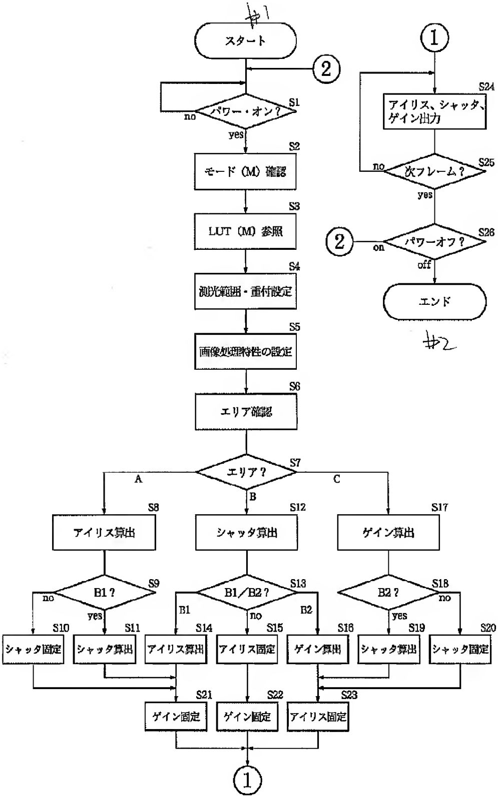
LUTデータ構成例（風景撮影モード）

#1 #2 #3 #4

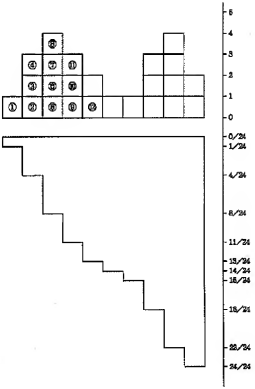
No	パラメーター	属性	データ記述形式	データ
01	アイリス #5	f(Y)	閾値定義 #6	Y≧y1 ⇒CAL y1>Y ⇒OPEN
02	シャッター #7	f(Y)	閾値定義 #8	⇒標準値 #9
03	AGCゲイン #10	f(Y)	閾値定義 #11	Y≧y2 ⇒±0dB y2>Y ⇒CAL
04	AEウエイティング #12	f(Y) #15	HIST定義 #13	HIGH－LIGHT 12/24BROCKS（下位12BROCKS）
05	AE基準値 #14	固定	数値定義 #16	50［IRE］
06	画質調整 #17 #18	固定	CODE定義 #19	NORMAL
07	画像効果処理 #20	固定	CODE定義 #22	NORMAL

#21

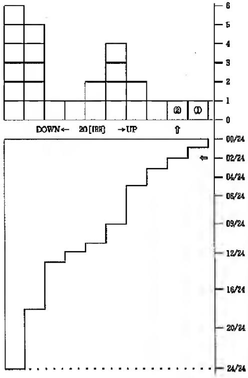
【図11】


#1
スタート
②
S1
パワー・オン？
no
yes
S2
モード（M）確認
S3
LUT（M）参照
S4
測光範囲・重付設定
S5
画像処理特性の設定
S6
エリア確認
S7
エリア？
A
B
C
S8
アイリス算出
S12
シャッタ算出
S17
ゲイン算出
S9
B1？
no
yes
S13
B1／B2？
B1
no
B2
S18
B2？
yes
no
S10
シャッタ固定
S11
シャッタ算出
S14
アイリス算出
S15
アイリス固定
S16
ゲイン算出
S19
シャッタ算出
S20
シャッタ固定
S21
ゲイン固定
S22
ゲイン固定
S23
アイリス固定
①
①
S24
アイリス、シャッタ、ゲイン出力
S25
次フレーム？
no
yes
S26
パワーオフ？
on
off
②
エンド
#2

【図14】



【図17】

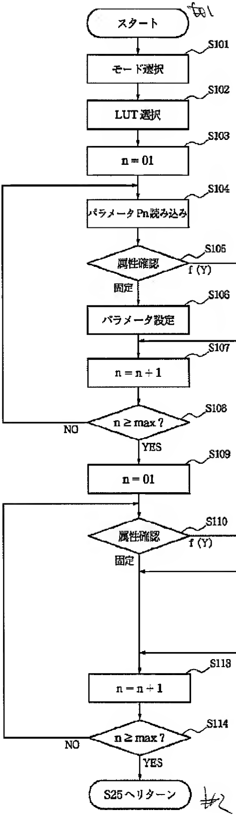


【図16】

LUTデータ構成例（夜景撮影モード）

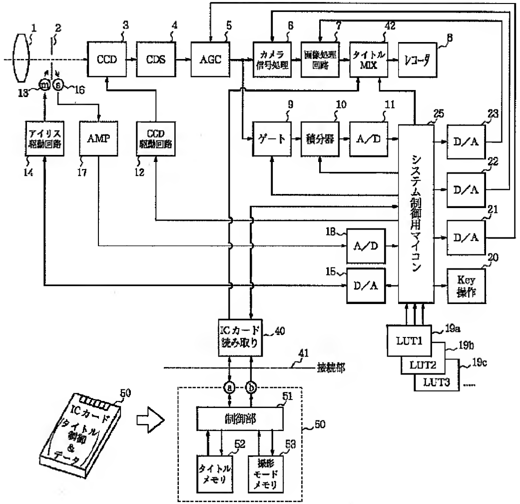
No	パラメーター #1	属性 #2	データ記述形式 #3	データ #4
01	アイリス #5	f(Y)	閾値定義 #6	Y≧y1 ⇒CAL y1>Y ⇒OPEN
02	シャッター #7	f(Y)	閾値定義 #8	⇒標準値 #9
03	AGCゲイン #10	f(Y)	閾値定義 #11	Y≧y2 ⇒±0dB y2>Y ⇒CAL
04	AEウエイティング #12	f(Y)	HIST定義 #13	HIGH－LIGHT 2/24BROCKS
05	AE基準値 #14	#15 固定	数値定義 #16	20［IRE］
06	画質調整 #17	#18 固定	CODE定義 #19	NORMAL
07	画像効果処理 #19	固定	CODE定義	NORMAL
08	20	#20 21	#21 22	

【図15】

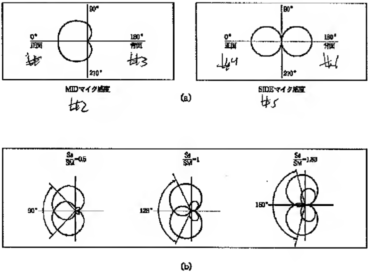


スタート
S101
モード選択
S102
LUT選択
S103
n＝01
S104
パラメータPn読み込み
S105
属性確認
f (Y)
固定
S106
パラメータ設定
S107
n＝n＋1
S108
n ≧ max ?
NO
YES
S109
n＝01
S110
属性確認
f (Y)
固定
S111
入力データ確認
NO
YES
S112
出力データ算出
S113
n＝n＋1
S114
n ≧ max ?
NO
YES
S25へリターン

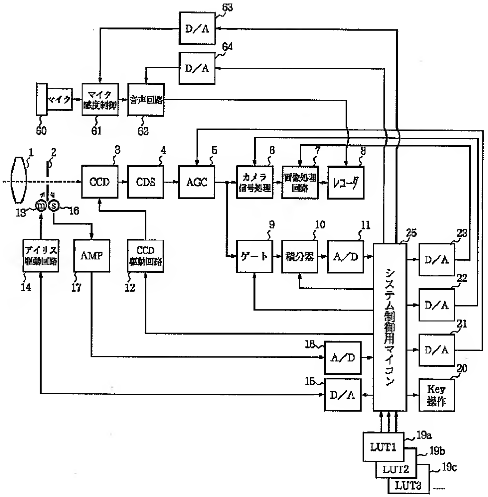
【図19】


CCD
CDS
AGC
カメラ信号処理
画像処理回路
タイトルMIX
レコーダ
ゲート
積分器
A/D
システム制御用マイコン
D/A
Key操作
アイリス駆動回路
AMP
CCD駆動回路
LUT1
LUT2
LUT3
ICカード読み取り
接続部
ICカード（タイトル制御＆データ）
制御部
タイトルメモリ
撮影モードメモリ

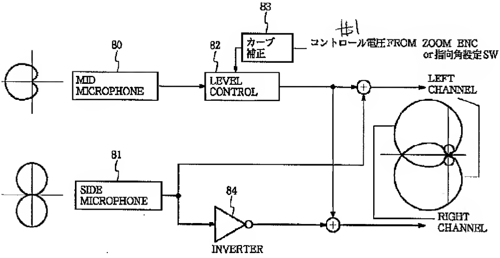
【図21】


90°
0° 正面
180° 背面
270°
MIDマイク感度
SIDEマイク感度
(a)
90°
120°
180°
(b)

【図20】


63
D／A
64
D／A
マイク
マイク感度制御
音声回路
60
61
62
1
2
3
4
5
6
7
8
CCD
CDS
AGC
カメラ信号処理
画像処理回路
レコーダ
13
16
9
10
11
25
23
ゲート
積分器
A／D
D／A
アイリス駆動回路
AMP
CCD駆動回路
14
17
12
22
システム制御用マイコン
D／A
21
18
A／D
D／A
20
15
D／A
Key操作
LUT1
19a
19b
LUT2
19c
LUT3

【図22】


83
カーブ補正
#1
コントロール電圧FROM ZOOM ENC or指向角設定SW
80
82
MID MICROPHONE
LEVEL CONTROL
LEFT CHANNEL
81
SIDE MICROPHONE
84
INVERTER
RIGHT CHANNEL